



UNIVERSIDADE DE LISBOA

Faculdade de Medicina Veterinária

PERFORMANCE EVALUATION IN IRISH RACEHORSES WITH DORSAL DISPLACEMENT  
OF THE SOFT PALATE FOLLOWING THE LARYNGEAL TIE-FORWARD PROCEDURE

RICARDO MAÇARICO BAIÃO

CONSTITUIÇÃO DO JÚRI

Doutora Paula Alexandra Botelho Garcia de  
Andrade Pimenta Tilley

Doutor José Paulo Pacheco Sales Luís

Doutora Maria Rita Martins Garcia da Fonseca

ORIENTADOR

Doutor José Paulo Pacheco Sales Luís

CO-ORIENTADOR

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I dedicate this work to my  
father who hasn't had the  
chance to see me finish it.



## **Acknowledgments**

This is the final step from a journey that I choose to be my life. During this journey, many people positively interfered, so here is my acknowledgment to all of them.

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## **Abstract**

### Performance evaluation in Irish racehorses with dorsal displacement of the soft palate following the laryngeal tie-forward procedure

The horse races are a very important money income in Ireland, being required that the racehorses show the full potential at the races. The dorsal displacement of the soft palate (DDSP) is a common cause of poor performance and exercise intolerance in racehorses being the laryngeal tie-forward procedure the surgical technique with the highest success rate on the correction of this condition. A performance evaluation study was performed to evaluate the significance of the laryngeal tie-forward procedure for correction of DDSP in racehorses.

The race performance data was collected for the horses ( $n = 16$ ) and the effect of surgery on racing performance, the effect of recovery time in earnings and the difference of the earnings by sex and age were analyzed.

The racing performance improves after surgery ( $P = 0,0138$ ), with an increase in the earnings three times the baseline value four races after surgery.

The laryngeal tie-forward procedure corrects DDSP, increasing the race performance above the baseline value.

Key words: racehorses, DDSP, race performance, laryngeal tie-forward, earnings.





## Resumo

Avaliação da performance desportiva em cavalos de corrida irlandeses com deslocamento dorsal do palato mole após a realização de cirurgia para movimento rostral da laringe

As corridas de cavalos são uma grande fonte de riqueza na Irlanda, sendo importante que os cavalos de corrida apresentem o potencial máximo durante as corridas. O deslocamento dorsal do palato (DDP) é uma causa comum de diminuição da performance e de intolerância ao exercício em cavalos de corrida, sendo a cirurgia para movimento rostral da laringe a técnica cirúrgica com maior taxa de sucesso no tratamento desta condição. Foi realizado um estudo para avaliar a significância da cirurgia para movimento rostral da laringe para correção de DDP na performance desportiva.

Os dados da performance desportiva foram recolhidos para todos os cavalos ( $n = 16$ ) e foi analisado o efeito da cirurgia na performance desportiva, o efeito do tempo de recuperação nos ganhos monetários e a diferença dos ganhos monetários por género e idade.

A performance desportiva melhora após a cirurgia ( $P = 0,0138$ ), aumentando os ganhos monetários três vezes o valor base, quatro corridas após a cirurgia.

A cirurgia para movimento rostral da laringe corrige o DDP, aumentando a performance desportiva para valores superiores ao valor base.

Palavras-chave: cavalos de corrida, DDP, performance desportiva, movimento rostral da laringe, ganhos monetários.



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## List of Abbreviations and Symbols

$\rho$  - rho

% - per cent

ANOVA – analysis of variance

CA – cases

cm – centimeter

CO – controls

DDSP – dorsal displacement of the soft palate

DMSO – dimethyl sulfoxide

GBP – pound

H<sub>2</sub>O – water

IV – intravenous

L/sec – liter per second

mg – milligram

mg/ml – milligram per milliliter

ml – milliliter

mm – millimeter

n – sample size

NSAID – non steroid anti-inflammatory drug

° - degrees

P – p value

PI – palatal instability

PO – *per os*

qod – every other day

s.d. – standard deviation

sid – once a day

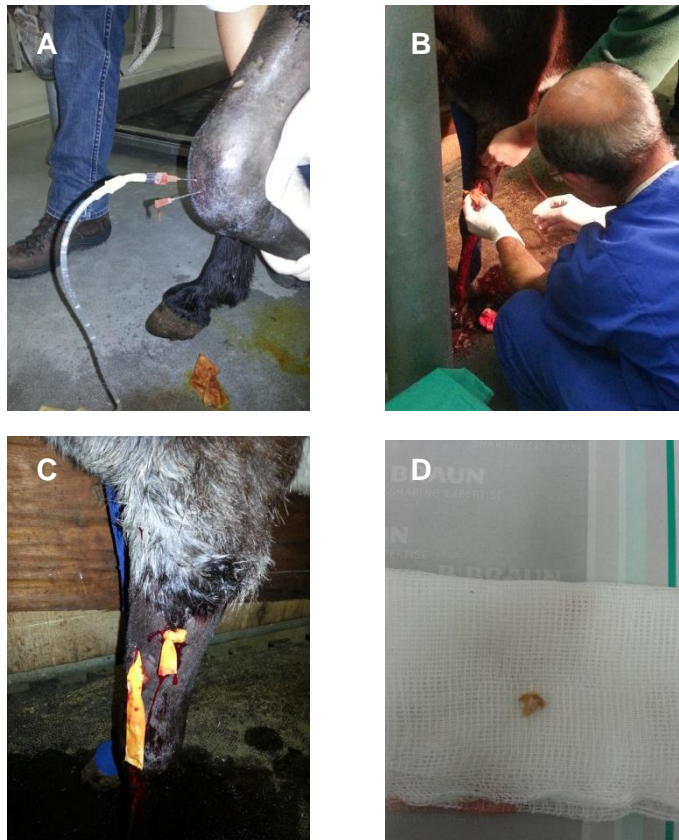
### Training period activities

In the last year of the integrated masters in veterinary medicine, the author took a training period of approximately six months in two different locations – at the Equine Hospital, Faculty of Veterinary Medicine, University of Lisbon (FMV-ULisboa) from 20<sup>th</sup> October to 21<sup>st</sup> December 2013; and at Anglesey Lodge Equine Hospital – Ireland, the latter under the LLP/Erasmus Program, between 6<sup>th</sup> January to 20<sup>th</sup> April 2014. The training period was supervised by Prof. Doctor José Paulo Pacheco Sales Luís (FMV-ULisboa) and co-supervised by Doctor Turlough Mc Nally (Anglesey Lodge Equine Hospital).

During the first part of the training period, held in Lisbon, the author followed two veterinarians in the routine activities of the Equine Hospital. In this period, it was possible to help with the diagnosis/evaluation of osteoarthritis lesions in Lusitano horses of the Portuguese School of Equestrian Art, doing lameness examination to establish what was the affected limb or to evaluate if the horse was improving with the treatment. The lesions were evaluated using radiography and ultrasonography.

In the Equine Hospital it was possible to follow a case of a donkey with a bite from a dog (Figure 1).

Figure 1: A: Joint lavage of the carpal joint (original); B: Abscess drainage on the left thoracic limb (original); C: Penrose drain placed at the abscess site (original); D: Canine tooth fragment removed from the left thoracic limb (original).

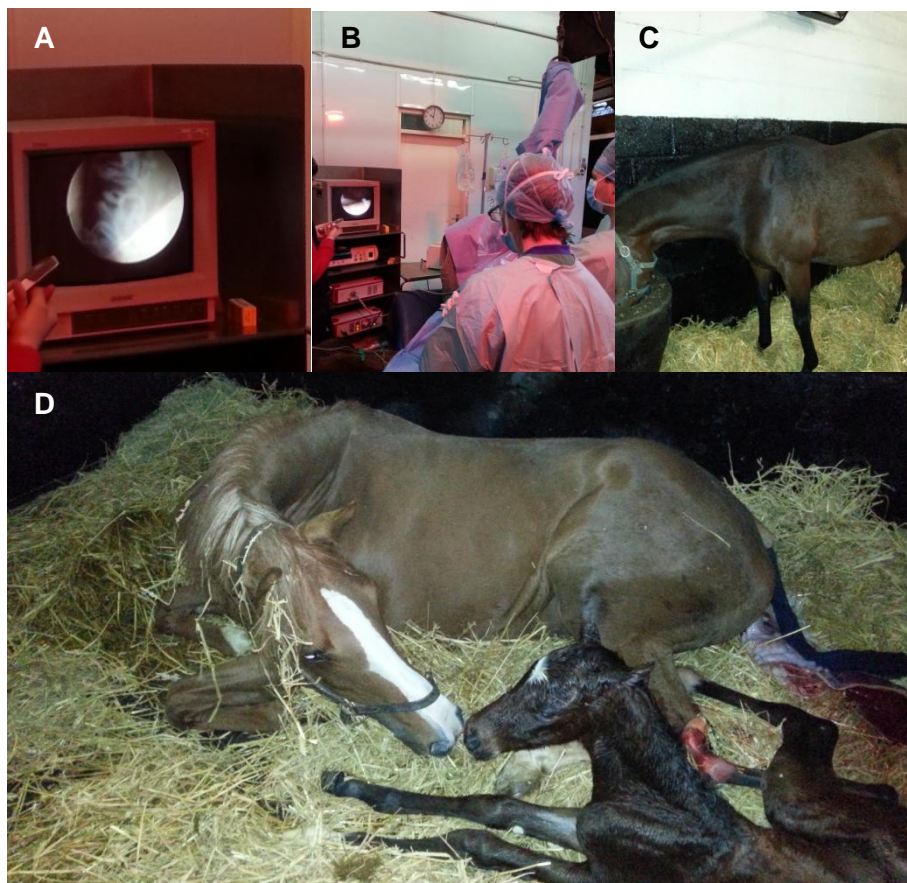


The author also followed a case of a filly with a fracture of the second phalanx of the left pelvic limb, being the evolution of the fracture line evaluated using radiography. Twice a day was made a cooling bath in the hoof and fetlock to decrease the temperature of the affected limb, managing the inflammatory process in the fracture site.

Another case followed by the author at the Equine Hospital was a corneal ulceration in a male horse probably caused by a foreign body. Antifungal, antimicrobial, anti-inflammatory and atropine eye drops were done to help with the healing of the ulcer. For a better adherence of the corneal epithelium during the healing process, a grid was made in the corneal stroma.

In Anglesey Lodge Equine Hospital, the author gathered all the cases that were used in the work presented in this document. In the first weeks, the author was introduced to the routine procedures done in the hospital and integrated in the staff schedule for the daily rotations between surgery, imaging and hospitalized horses. The training period was during the foal season, so most of the medicine cases that the author was exposed to were pregnant mares with placentitis and neonatology cases of prenatal asphyxia and the surgery cases were mostly upper airway laser surgery and joint lavages with arthroscopy (Figure 2).

Figure 2: A: Sinovial cartilage image during arthroscopy (original); B: Joint lavage with arthroscopy (original); C: Pregnant mare with placentitis (original); D: Newborn foal from a mare with placentitis (original)





The author also had to do night rotations following one of the interns of the Anglesey Lodge Equine Hospital.

During the hospitalized horses rotation, the author had the opportunity to follow a case of thromboembolism in the external iliac artery, confirmed by rectal ultrasonography. Also had the opportunity to follow one foal with one abscess in the left eye, being treated with antimicrobial collyrium twice a day.

During the surgery rotation, the area to which the author was more exposed was the upper respiratory surgery, being the most common pathologies the DDSP and laryngeal hemiplegia. The author also had the opportunity to follow two cesareans of which only one foal survived, being necessary to do cardiopulmonary resuscitation to the survival foal. In the orthopedic area, the most common pathology that the author was exposed to was osteocondral fragments that were removed with arthroscopy.

The foaling season made that the majority of the medicine cases were foals and pregnant mares needing intensive care also during the night. The author, during the night rotations, was exposed to neonatal intensive care in foals with prenatal asphyxia syndrome, being necessary to give parenteral nutrition and to control the glicemic value, being necessary in some foals to start the administration of insulin. During the night rotations, the author also had the opportunity to help in a dystocic foaling.

## **1. Introduction**

The horse races are a very important money income in Ireland, being the racehorses very valuable. Therefore, is very important that the racehorses show the full potential at the races, being the performance evaluation a key point for the veterinarians (UCD Dublin - School of Agriculture and Food Science, 2012).

The sports performance is the result of the interaction of several physiologic systems, being the dysfunction of one that decreases the sportive capacity of the horses (Franklin S. & Allen K., 2008).

The respiratory system is fundamental for the horse's performance, once a good oxygen supply is essential for a proper muscular function (Marlin D. & Nankervis K., 2002).

The limiting factors for the sports performance vary with the type of exercise done by the horse, being a small obstruction of the upper airways a major problem in racehorses (Hinchcliff & Geor, 2008).

The dorsal displacement of the soft palate (DDSP) is a common cause of poor performance and exercise intolerance in racehorses (Ainsworth & Cheetham, 2010), being this the main reason for choosing the theme of this dissertation.

There are numerous surgical options for correction of DDSP. The success rates vary for each surgical option, being the laryngeal tie-forward procedure the surgical option with the higher success rate (Woodie, Ducharme, Kanter, Hackett, & Erb, 2005).

This dissertation aims to evaluate the response in sports performance after the laryngeal tie-forward procedure for the correction of DDSP in racehorses.

In the first part of the first chapter of this document the anatomical description of the pharynx, focused on the functional anatomy will be presented. The second part of the first chapter refers to DDSP, and the etiology, clinical signs, diagnose techniques and non-surgical and surgical treatment are described.

The second chapter addresses the study developed, including material and methods, results, discussion and conclusion of all the research performed.

## **2. Literature Review**

### **2.1. Pharynx**

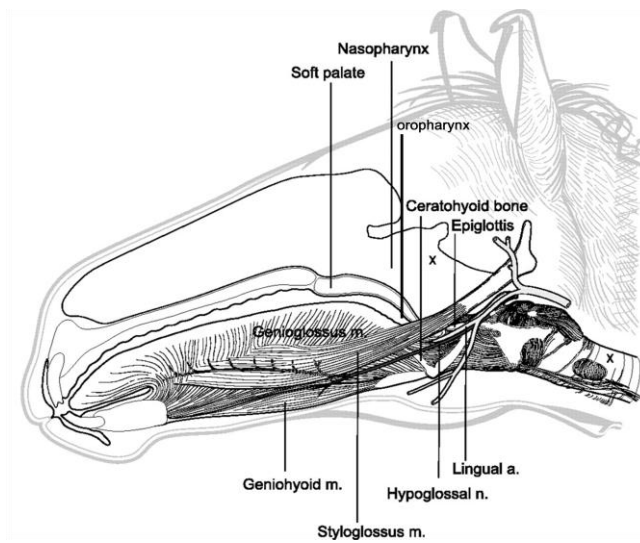
#### **2.1.1. Functional anatomy of the pharynx**

The pharynx is a musculomembranous tubular structure not directly supported by bone or cartilaginous matrix that represents both a part of the digestive and respiratory tract. It has a funnel shape, being wider and larger rostrally than caudally and its long axis is directed obliquely in a ventral and caudal direction measuring about 15 cm (Hare, 1975). The pharyngeal cavity has seven openings: two choanae, two pharyngeal openings of the eustachian tubes, the oral opening, the laryngeal opening and the esophageal opening (Rush & Mair, 2004). The two choanae allow the communication between the oral and nasal cavities. The two pharyngeal openings of the eustachian tubes are located on the lateral wall of the pharynx, caudally to the choanae and at the same level of the ventral nasal meatus. These openings look like clefts and are directed ventral and caudal and have about 3 cm of length (Dyce, Sack & Wensing, 2004). Caudal to the openings of the eustachian tubes are the pharyngeal recess (Rush & Mair, 2004). The oral opening is limited dorsally by the soft palate, ventrally by the base of the tongue and laterally by the palatoglossal arches of the soft palate. It is not a wide opening and is closed by the soft palate in normal conditions, except during deglutition. The laryngeal opening occupies most of the ventral wall of the pharynx, being closed only during deglutition. The esophageal opening is caudal to the laryngeal opening (Hare, 1975).

The anatomic references of the pharynx are the base of the cranium and the guttural pouches dorsally, the larynx ventrally and the medium pterygoid muscle, the stylohyoid bone, the extern carotid artery and the lingual trunk, the glossopharyngeal, rostral laryngeal and hypoglossal nerves, the mandibular salivary gland and the retropharyngeus lymph nodes laterally. The pharynx extends from the caudal aspect of the nasal and oral cavities and connects these cavities to the larynx and esophagus (Holcombe & Ducharme, 2004).

The pharynx is composed of 1) the nasopharynx, 2) the oropharynx and 3) the laryngopharynx. The soft palate forms the division of the pharynx into nasopharynx dorsally and oropharynx ventrally (Derksen, 2012) (Figure 3).

Figure 3: Equine upper airway anatomy (adapted from Cheetham *et al.* 2009)



Legend: m = muscle; n = nerve; a = artery

The soft palate is a musculomembranous velum and inserts on the hard palate, leaning ventrally and cranially. The oral surface is ventral and is covered by a mucous membrane that continues from the hard palate and has a rounded medial ridge that usually is flanked by a sagittal fold from each side. On this surface, the soft palate contains the palatine glands and their ducts (Holcombe & Ducharme, 2004). From each side of the oral surface of the soft palate, there is a short and thick fold that crosses on the lateral board of the tongue originating the palatoglossal arch of the soft palate. The dorsal surface of the soft palate is the pharyngeal surface and is lined by nasal mucous membrane (Sisson, 1975). During breathing the epiglottis lies dorsal to the soft palate and the caudal free margin of the soft palate is in intimate contact with the subepiglottic tissue (Derksen, 2012). During swallowing, contraction of the muscles at the base of the tongue and walls of the pharynx pushes ingesta to the caudal portion of the oropharynx causing dorsal elevation of the soft palate and retroversion of the epiglottis (Barakzai, 2007). It continues caudally by two folds that flank the larynx and originate the palatopharyngeal arch, caudal to the esophageal opening. The space between the palatoglossal and palatopharyngeal arches, the tonsillar fossa, is occupied by the tonsils (Holcombe & Ducharme, 2004). In the horse, there are no compact tonsils like in other mammals like the human or the dog, so the tonsil is an extension of lymphoid masses from the base of the tongue, with a caudal path of 10 cm. Because the tonsil is not a compact structure, between the lymphoid masses there are crypts, and that's where the ducts of the tonsil open (Hare, 1975). The soft palate of the horse is well developed, being the median length 15 cm. The length and the intimate contact with the epiglottis could explain the fact that the horse is an obligate nasal breather (Holcombe &

Ducharme, 2004). The pharyngeal aponeurosis is located on the dorsal surface of the soft palate, being formed by the expansion of the tendon of the tensor veli palatini muscle and attaches to the caudal margin of the hard palate. This structure is thicker cranially and very thin caudally where the soft palate is more muscular. The blood supply to the soft palate is derived from the linguofacial trunk and maxillary artery and venous drainage is by the accompanying veins. The lymphatic drainage is toward the retropharyngeal lymph nodes. The afferent innervation from branches of the trigeminal, glossopharyngeal, and vagus nerves arises from pressure, mechanical, and temperature receptors lining the mucous membrane of the nasopharynx, including the soft palate (Derksen, 2012). The position of the soft palate is partially determined by the coordinated function of four muscles that are included in the intrinsic muscles of the nasopharynx: tensor veli palatini, levator veli palatini, palatinus and palatopharyngeus (Holcombe & Ducharme, 2004).

The laryngopharynx, which is lined by stratified squamous epithelium (Rush & Mair, 2004), begins at the base of the epiglottis and extends caudally to the arch of the cricoid cartilage (Derksen, 2012).

Positioned ventrally, the oropharynx is located caudal to the 6<sup>th</sup> cheek teeth, is limited by the soft palate dorsally and by the epiglottis caudally (Barakzai, 2007).

The nasopharynx is attached to the pterygoid, palatine and hyoid bones and to the cricoid and thyroid cartilages of the larynx by muscles that cause dilation and constriction of this structure (Hare, 1975). Although the nasopharynx is not directly supported by bone or cartilage, it must withstand large changes in intraluminal pressures, that vary from 24 to 50 cm H<sub>2</sub>O, that occur at varying airflow velocities with minimal changes in diameter in the normal horse. It does this through muscular contraction, whose sensory drive is not well understood in horses (Holcombe & Ducharme, 2004). The blood supply to the nasopharynx is provided by the common and external carotid arteries and the linguofacial trunk and venous drainage is by the accompanying veins. The lymphatic drainage is toward the retropharyngeal and cranial cervical lymph nodes. The afferent sensory innervation of the nasopharynx is derived from the trigeminal, glossopharyngeal and vagus nerves (Sisson, 1975).

The musculature that is involved with the nasopharynx can be classified as intrinsic or extrinsic to this structure. The intrinsic group includes the muscles of the soft palate and pharynx, and the extrinsic group includes the muscles of the larynx and hyoid apparatus (Derksen, 2012).

### **2.1.1.1. Intrinsic muscles of the nasopharynx**

The intrinsic muscles of the nasopharynx are composed of: tensor veli palatini, levator veli palatini, palatinus, palatopharyngeus and stylopharyngeus (Holcombe & Ducharme, 2004).

The tensor veli palatini muscle is innervated by the mandibular branch of the trigeminal nerve (Derksen, 2012) and is a fusiform and flattened muscle that originates at the muscular process of the petrous part of the temporal bone, pterygoid bone and lateral lamina of the auditory tube and travels rostroventrally along the lateral wall of the nasopharynx. The tendon of this muscle courses around the hamulus of the pterygoid bone and ramifies in the palatine aponeurosis (Sisson, 1975). This tensor veli palatini muscle acts in the rostral aspect of the soft palate tensing it and depressing this aspect of the soft palate toward the tongue using the hamulus of the pterygoid bone as a pulley, retracting the palate away from the dorsal pharyngeal wall, expanding the nasopharynx and lightly depressing it ventrally during inspiration (Rush & Mair, 2004).

The levator veli palatini muscle is innervated by the pharyngeal branch of the vagus nerve (Derksen, 2012) and arises from the muscular process of the petrous part of the temporal bone and the lateral lamina of the auditory tube and passes along the lateral wall of the nasopharynx, medial to the tensor veli palatini, to insert within the soft palate, dorsal to the glandular layer. This muscle elevates the soft palate during swallowing closing the choanae (Sisson, 1975), and also seems to have some responsibility in the vocalization (Rush & Mair, 2004).

The palatinus muscle is also innervated by the pharyngeal branch of the vagus nerve and consists of a paired fusiform muscle that originates from the caudal aspect of the palatine aponeurosis. This muscle courses through the middle of the soft palate, just beneath the nasal mucosa, to ramify in the caudal free margin of the soft palate (Sisson, 1975).

The palatopharyngeus muscle arises from the palatine aponeurosis, laterally to the palatinus muscle attachment, and from the palatine and pterygoid bones. The fibers continue caudally on the lateral wall of the pharynx and partially insert in the upper edge of the thyroid cartilage. The remaining portion of this muscle continues dorsally and inserts at the median fibrous raphe (Sisson, 1975). Its innervation is from the pharyngeal branch of the vagus nerve (Holcombe & Ducharme, 2004).

The combined contractions of the palatinus and palatopharyngeus muscles depress the caudal part of the soft palate toward the tongue shortening it, controlling the position of this structure (Rush & Mair, 2004).

The last muscle of the intrinsic group is the stylopharyngeus, which is divided into two parts, one rostral and the other caudal. The rostral stylopharyngeus originates from the medial surface of the rostral end of the stylohyoid bone and inserts on the pharyngeal raphe. This muscle is a pharyngeal constrictor that is not known to be stimulated during exercise, so it will not be discussed. The caudal stylopharyngeus is a pharyngeal dilator that originates from

the medial aspect of the caudal third of the stylohyoid bone and courses ventrally and rostrally to attach on the dorsolateral wall of the pharynx. The caudal part is responsible for tensing the roof of the nasopharynx and helps to prevent pharyngeal collapse with inspiratory pressure. It is innervated by the glossopharyngeal nerve (Derksen, 2012).

This group of muscles contributes to the stability by contractions that tense and dilate the walls of the pharynx (Derksen, 2012).

### **2.1.1.2. Extrinsic muscles of the nasopharynx**

The extrinsic muscles of the nasopharynx are composed of: genioglossus, geniohyoideus, styloglossus, hyoglossus, sternohyoideus and sternothyroideus, hyoepiglotticus and thyrohyoideus (Derksen, 2012).

The genioglossus muscle is a paired funnel shaped extrinsic tongue muscle that originates within the median plane of the tongue and attaches to the medial surface of the mandible, caudal to the symphysis. This muscle is separated from the muscle of the opposite side by a fatty layer and connective tissue (Sisson, 1975). It is innervated by the medial branch of the hypoglossal nerve (Holcombe & Ducharme, 2004). The contraction of the fibers of this muscle has varied actions, depending on the fibers that are contracted. The contraction of the rostral fibers of the genioglossus muscles retracts the tip of the tongue and the contraction of the medial fibers pull the tongue down, but the most important action of this muscle is made by the contraction of the caudal fibers, protracting the tongue and pulling the basihyoid bone rostrally (Sisson, 1975). This activity can be simulated by using a tongue-tie (Derksen, 2012).

The geniohyoideus muscle is a paired wide and fusiform rostrohyoid muscle that originates in conjunction with the genioglossus, on the medial surface of the molar portion of the mandible, and inserts on the basihyoid bone. It is innervated by the main branch of the hypoglossus nerve and the facial nerve and irrigated by the sublingual artery. The geniohyoideus protrudes the tongue and pulls the hyoid apparatus rostrally (Sisson, 1975).

The styloglossus muscle is a thin and wide paired muscle that lies on the lateral aspect of the tongue which originates on the lateral surface of the stylohyoid bone, next to the joint with the ceratohyoid bone and inserts on the tip of the tongue (Sisson, 1975). It is innervated by the lateral branch of the hypoglossal nerve (Holcombe & Ducharme, 2004). Contraction of this muscle retracts the tongue, but if only one side of the muscle contracts, it make the tongue turn towards the side that the muscle contracts on (Sisson, 1975).

The hyoglossus muscle originates in the lingual process of the hyoid apparatus and stylohyoid and thirohyoid bones and inserts on the median plane of the dorsal surface of the tongue and is positioned medial to the styloglossus muscle. It is innervated by the lateral branch of the hypoglossal nerve. The action of the hyoglossus muscle is retraction and depression of the base of the tongue (Derksen, 2012).

The sternohyoideus muscle and the sternothyroideus muscle, also known as the sternothyrohyoideus, are caudohyoid muscles that originate on the sternal manubrium and extend cranially. The sternohyoideus inserts on the basihyoid bone and lingual process of the hyoid apparatus, and the sternothyroideus inserts on the caudal edge of the thyroid cartilage lamina of the larynx (Sisson, 1975). Both of these muscles receive motor innervation from the ventral branch of the first and second cervical nerves and irrigation from the common carotid artery. The action of the sternothyrohyoideus muscle is retraction of the hyoid apparatus, base of the tongue and larynx (Holcombe & Ducharme, 2004).

The hyoepiglotticus muscle is a small muscle that can be simple or bifid and originates on the basihyoid bone, inserting on the basal portion of the rostral surface of the epiglottis, being the only muscle that are inserted on this cartilage. It is innervated by the main branch of the hypoglossal nerve. The contraction of the hyoepiglottic muscle pulls the basihyoid towards the epiglottis (Sisson, 1975), increasing the ventral dimension of the rima glottidis (Derksen, 2012).

The last muscle of the extrinsic group is the thyrohyoideus that is a squared muscle, extending from the lateral lamina of the thyroid cartilage of the larynx to the caudal edge of the thyrohyoid bone (Sisson, 1975). It is innervated by the thyrohyoid branch of the hypoglossal nerve, but one study in rabbits has shown that the innervation of this muscle could be achieved by the pharyngeal branch of the vagus nerve (Derksen, 2012). Contraction of the thyrohyoideus muscle increases the stability of the soft palate during exercise by moving the larynx rostrally, letting the thyroid cartilage rest more rostral and dorsal in relation to the basihyoid bone (Derksen, 2012).

This group of muscles contributes to the respiratory patency of the nasopharynx, increasing its diameter through change in size of the oropharynx or position of the larynx and increase the stability of the soft palate during exercise. The potential roles of these muscles have been identified in horses when interfering with their function, resulting in dorsal displacement of the soft palate during exercise (Holcombe & Ducharme, 2004).



## **2.2. Dorsal displacement of the soft palate (DDSP)**

The soft palate of the horse provides an airtight seal around the larynx (Dowling, Hodgson, & Rose, 2000), not allowing for communication between the oropharynx and the nasopharynx during respiration (Radostits, Gay, Hinchcliff, & Constable, 2007). This makes it possible that the airflow during exercise is efficient (Dowling *et al.*, 2000). The position of the soft palate is subepiglottic (Rush & Mair, 2004) and only becomes dorsal to the epiglottis, in normal conditions, during deglutition (Radostits *et al.*, 2007). When it happens not during deglutition, it's called dorsal displacement of the soft palate (DDSP), and may be intermittent or persistent (Rush & Mair, 2004). In DDSP, the caudal free margin of the soft palate displaces dorsally and the epiglottis cannot be seen in the nasopharynx, being located in the oropharynx. The free edge of the soft palate goes across the rima glottidis during exhalation creating an airway obstruction during inspiration (Ducharme, 2012b).

Dorsal displacement of the soft palate is a common cause of poor performance and exercise intolerance in racehorses (Ainsworth & Cheetham, 2010). When intermittent, this occurs during exercise and it is usually associated with abnormal respiratory sounds (Rush & Mair, 2004), although some horses experience silent displacement (Ainsworth & Cheetham, 2010). Horses with intermittent DDSP are typically normal at rest and light exercise but will exhibit exercise intolerance during strenuous exercise (Ducharme & Hackett, 1997). This condition is commonly associated with other pharynx diseases, especially accompanied by pharynx inflammation (Rush & Mair, 2004).

Persistent DDSP is observed even with the horse at rest and is usually associated with dysphagia (Ducharme, 2012a). It is also possible to see signs of tracheal aspiration (Ducharme & Hackett, 1997) which may lead to infection of the lower respiratory tract (Ducharme, 2012a). This condition is usually the result of disruption of the nerve supply to the pharynx (Radostits *et al.*, 2007) or anatomic abnormalities (Ducharme & Hackett, 1997).

### **2.2.1. Etiology**

The nasopharynx has to withstand large intraluminal pressure variations between 30 to 60 cm H<sub>2</sub>O during respiration, without any support of bone or cartilage. In addition, this structure is exposed to a turbulent airflow with a maximum velocity of 90-100 L/sec, which can cause vibration of the soft tissues (Rush & Mair, 2004).

The stability of the nasopharynx is obtained through the muscular contraction of the intrinsic and extrinsic muscles of this structure (Rush & Mair, 2004).

The etiologic factors of DDSP are not well understood, but can be divided in intrinsic or extrinsic, depending on the muscles or structures that are affected (Ainsworth & Cheetham, 2010).

Intrinsic factors are associated with dysfunction of the intrinsic muscles of the soft palate, the most important ones being the palatines muscle and the palatopharyngeus muscle.

Dysfunction of these muscles may be associated with pharyngeal lymphoid hyperplasia in young horses. Dysfunction of the other muscles of the soft palate may result in respiratory obstruction, but not necessarily DDSP (Ainsworth & Cheetham, 2010).

Extrinsic factors are associated with the dysfunction of the muscles of the hyoid apparatus and larynx and alteration of the anatomy of the epiglottis and larynx (Ainsworth & Cheetham, 2010).

The first hypothesis for the occurrence of DDSP was paralysis of the palate muscles (Quinlan, Van Rensburg, & Starke, 1949) followed by elongation of the soft palate (Shappel, Caron, Stick, & Parks, 1989).

From the clinical perspective, mechanical factors seem to be associated with the etiopathogenesis of DDSP, once the correction of these factors promote the subepiglottic position of the soft palate to be reestablished. The mechanical factors include subepiglottic or palatal granulomas, cysts and masses. These factors predispose to DDSP either by mechanically interfering with the intimate contact between the caudal free edge of the soft palate and the subepiglottic tissue or by provoking irritation or pain that stimulates DDSP (Ducharme, 2012b).

Other hypothesis for the occurrence of DDSP is the association with epiglottic hypoplasia. It was thought that inadequate length or rigidity of the epiglottic cartilage could not hold the soft palate in its subepiglottic position (Linford, O'Brien, Wheat, & Meagher, 1983; Tulleners & Hamir, 1991). During exercise alteration of the position of the larynx occurs prior to DDSP, with this structure being retracted caudally, and the soft palate lifted against the ventral surface of the epiglottic cartilage, showing palatal instability (PI). Caudal retraction of the larynx causes an apparent flaccidity of the epiglottis (Ducharme, 2012b). A swallow seems to move the larynx rostrally, correcting its position. In horses with diagnosed intermittent DDSP it was showed that the incidence of swallowing increases in the minute prior to the occurrence of DDSP, supporting the hypothesis that the horses with DDSP are trying to stabilize an instable palate by swallowing (Pigott, Ducharme, Mitchell, Soderholm, & Cheetham, 2010). The flaccidity of the epiglottis should be seen as a result of the movement of the larynx and not as a cause of DDSP. The role of the epiglottis as an initiating factor of DDSP is questionable because DDSP does not occur when epiglottic retroversion is experimentally induced, not being the epiglottic cartilage in position to hold the soft palate in its normal subepiglottic position (Holcombe, Derksen, Stick, & Robinson, 1998).

Another factor that was thought to cause DDSP is the retraction of the tongue, which was hypothesized to lead to retraction of the larynx (Cook, 1981). When retraction of the tongue occurs, the base of the tongue may elevate and push the caudal edge of the soft palate dorsally, inducing DDSP. This idea led to the belief that the action of a tongue-tie, pulling the tongue cranially, would prevent this from happening. Several experimental investigations failed to identify a morphologic or physiologic effect from a tongue-tie (Beard, Holcombe, &

Hinchcliff, 2001; Cornelisse, Holcombe, Derksen, Berney, & Jackson, 2001; Cornelisse, Rosenstein, Derksen, & Holcombe, 2001), but an experimental investigation performed in 2012 with 12 normal horses (Chalmers, Farberman, Bermingham, Sears, & Viel, 2013) showed that the use of a tongue-tie on a standing horse, altered the position of the basihyoid. Although there is not a great amount of explanations about the effect of the use of a tongue-tie, clinical studies show that the use of a tongue-tie is beneficial. A clinical study performed with 6 horses, showed that in 2, DDSP was reversed with the use of a tongue-tie (Franklin, Naylor, & Lane, 2002) and a cohort study performed in the UK reported that the use of a tongue-tie appears to have a positive effect on racing performance (Barakzai, Finnegan, & Boden, 2009).

The clinical association of opening the mouth or swallowing during exercise and the occurrence of DDSP has led to the hypothesis that the air entering in the oropharynx when the horse opens the mouth disturbs the stabilizing effect of the sub atmospheric pressure on the ventral surface of the soft palate (Odeh, Schall, Gavriely, & Oliven, 1993). To prevent this occurrence, the use of dropped or figure-of-eight noseband was promoted, although there are no experimental data investigating the function of this piece of equipment (Ducharme, 2012b).

The position of the hyoid bone and of the larynx seems to be relevant to the occurrence of DDSP. Three studies that were recently realized show that the position of these structures is important predictive element in the occurrence of DDSP. In the first study was found that in horses with DDSP at exercise, the basihyoid is in a more ventral position (Chalmers, Yeager, & Ducharme, 2009), and in the same year, another study showed that a more dorsal position of the basihyoid and larynx after a laryngeal tie-forward procedure gives a better postoperative outcome (Cheetham, Pigott, Thorson, Mohammed, & Ducharme, 2008). The last study gave information about the position of the larynx of horses with permanent DDSP, with this structure being more caudal than in horses with intermittent DDSP (Ortved, Cheetham, Mitchell, & Ducharme, 2010). The position of the basihyoid and larynx could also be altered by the manipulation made by the rider at exercise, like changing the head position or the use of spurs in the thorax (Van Erck, 2011).

The studies presented before show structural conditions that could lead to DDSP, but DDSP also could be caused by functional disorders. From this point of view, there are three experimental cases that result in DDSP in horses.

The first experimental case showed that the blockade of the pharyngeal branch of the vagus nerve causes persistent but reversible DDSP, leading to the idea that the dysfunction of the palatinus and palatopharyngeus muscles could lead to DDSP (Holcombe *et al.*, 1998). A more recent study showed that the palatinus and palatopharyngeus muscles have respiratory related activity during exercise, strengthening the hypothesis that the dysfunction of these muscles could result in DDSP (Holcombe, Derksen, & Robinson, 2007).

The two other cases differ from the first one because in these two models the DDSP only occurs at exercise and in the first one it was permanent.

The second experimental case showed that the resection of the thyrohyoideus muscles causes DDSP, and the reconstruction of the action of these muscles corrects the DDSP. The findings in this study support the idea that these muscles are important to the stability of the nasopharynx and the dysfunction of these structures could result in DDSP (Ducharme *et al.*, 2003). Another study shows that the thyrohyoideus muscle activity decreases prior to the occurrence of DDSP (Ducharme, 2001).

The third experimental case showed that the blockade of the hypoglossal nerve results in intermittent DDSP at exercise, confirming that this nerve is responsible for the stability of the nasopharynx in horses. Although the blockade shows that this nerve is important, the experimental case doesn't differentiate between intrinsic and extrinsic muscles of the tongue (Cheetham *et al.*, 2009).

### **2.2.2. History and clinical signs**

Racehorses with intermittent DDSP usually have a history of poor performance and could be associated with a gurgling noise during exhalation (Cook, 1981) and it has been suggested that up to 30% of horses with DDSP make no audible abnormal respiratory sounds at exercise (Martin, Reef, Parente, & Sage, 2000). The poor performance generally is an acute problem that could be described by the trainer or owner as "choking down" or "swallowing the tongue", and the horse could also exhibit open-mouth breathing, because airflow is directed through the oropharynx during exhalation (Ducharme, 2012b). Horses used for show or pleasure could exhibit only the respiratory noise that could be exacerbated by head flexion (Van Erck, 2011).

### **2.2.3 Diagnosis**

Resting endoscopic examination of the nasopharynx in horses that are presented for investigation of respiratory noise and/or poor performance during exercise are performed to try to identify major structural abnormalities that are apparent at rest and to try to use the appearance and function at rest of the structures to predict their function during exercise (Barakzai & Dixon, 2011). Some alterations that could point to the diagnosis of DDSP during exercise are dorsal displacement of the palatal arch at rest provoked by nasal occlusion (Beard, 1996) or induced by swallowing (Hobo, Matsuda, & Yoshida, 1995).

More recently, several studies reported a weak link between the diagnosis of DDSP made by resting endoscopic examination and the confirmation by high speed treadmill endoscopy (HSTE) (Barakzai & Dixon, 2011) or over ground endoscopy (Kelly, Reardon, Johnston, & Pollock, 2013).

The gold standard for the diagnosis of intermittent DDSP is a group of exams that include the history of poor performance associated or not with respiratory abnormal noise, physical examination to rule out other causes of exercise intolerance and endoscopic examination at rest and during exercise either over ground or HSTE (Ducharme, 2012b). Although both over ground and HSTE are good at diagnosing DDSP, the treadmill exam has a higher diagnostic rate. This could happen because the treadmill exam is a more strenuous exercise than the over ground exam that is usually performed on the trainer's gallops. The over ground exam should recreate the conditions encountered during races (Allen & Franklin, 2010) (Figure 4).

Figure 4: Endoscope in place for dynamic endoscopy (adapted from Desmaizieres *et al.*, 2009)



If none of the exercise endoscopic exams could be performed, the resting endoscopic exam immediately after the cessation of the exercise should be performed, since the observation of DDSP during this exam will support the diagnosis (Ducharme, 2012b).

If only the resting endoscopic exam is available, a suggestive evidence of the occurrence of DDSP is the ulceration of the caudal edge of the soft palate (Lane, Bladon, Litte, Naylor, & Franklin, 2006). The tracheoendoscopy allows assessing this area of the soft palate by introducing the endoscope in the proximal trachea and inducing the gag reflex, being possible to see the caudal free edge of the soft palate after withdrawing the endoscope. The exam of the free edge of the soft palate can also be performed under sedation and applying 50 to 100 ml of lidocaine hydrochloride on the soft palate and epiglottis, using an equine laryngeal forceps to elevate the epiglottic cartilage (Ducharme, 2012b).

## 2.2.4. Treatment

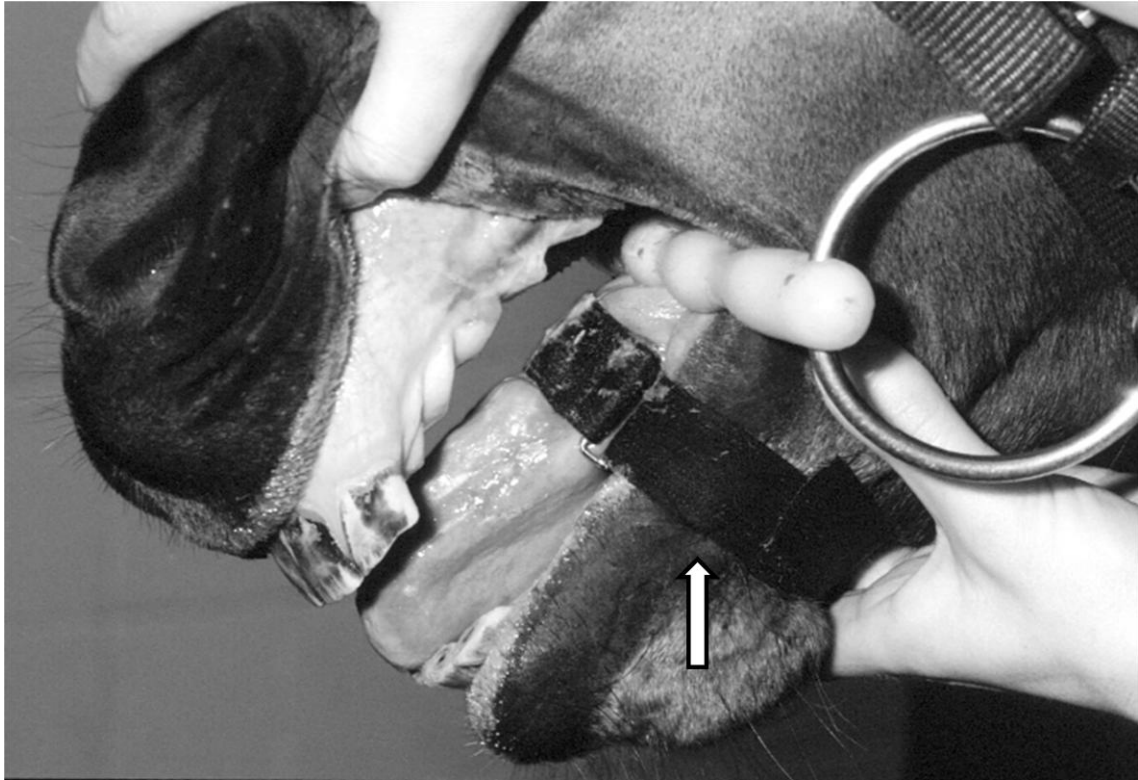
### 2.2.4.1. Non surgical management of DDSP

The dysfunction of the pharyngeal branch of the vagus nerve may be caused by inflammation in the nearby structures such as the guttural pouches and the nasopharyngeal wall, interfering with the tone of the palatinus and palatopharyngeus muscles, leading to DDSP (Holcombe *et al.*, 1998). It was also suggested that horses diagnosed with DDSP have a high prevalence of upper airway inflammatory diseases (Hobo *et al.*, 1995). If inflammation of the upper airways is diagnosed, treatment should include corticosteroid therapy with dexamethasone IV or PO, starting with 30 mg sid for 3 days, followed by 20 mg sid for 3 days, then 10 mg sid for 3 days ending with 10 mg qod for three treatments. Along with the corticosteroid therapy, throat spray, composed by 250 ml of glycerin, 250 ml of 90% DMSO, 500 ml of nitrofurazone and 50 ml of prednisolone 25 mg/ml may be used. Also unfitness and immaturity of the horse should be considered as a cause of DDSP (Ducharme, 2012b).

There are some tack changes that could help to prevent DDSP. The use of a dropped or figure-of-eight noseband may prevent DDSP by keeping the horse from opening its mouth, not letting the airflow to go into its oropharynx (Woodie, Ducharme, Hackett, *et al.*, 2005). It has also promoted the use of a bit that secures and/or restricts the caudal movement of the tongue, such as a W bit, a spoon bit or a “Serena song” bit, combined with the use of a tongue-tie (Ducharme, 2012b), but none of this bits have been statistically validated.

The tongue-tie is typically a piece of nylon or other elastic material used to tie the tongue rostrally and laterally through the diastema to the bridle or to the mandible (Chalmers *et al.*, 2013) (Figure 5). The use of the tongue-tie is controversial, as in some studies there are no positive out-come with the use of a tongue-tie, neither in the hyoid apparatus position and nasopharynx diameter (Cornelisse, Rosenstein, *et al.*, 2001) nor in the airway patency (Beard *et al.*, 2001; Cornelisse, Holcombe, *et al.*, 2001) and in others there are some positive out-comes, showing that the tongue-tie alters the position of the lingual process and the thyroid cartilage in the standing horse (Chalmers *et al.*, 2013) and showing a performance improvement (Barakzai *et al.*, 2009). The hypothesis that lead to the use of the tongue-tie is that it prevented the caudal retraction of the tongue and, almost certainly prevents the root of the tongue from applying dorsal pressure on the ventral surface of the soft palate or prevents the basihyoid or larynx from moving caudally (Franklin *et al.*, 2002).

Figure 5: Horse with a tongue-tie in place (arrow) (adapted from Franklin, Naylor & Lane, 2002)

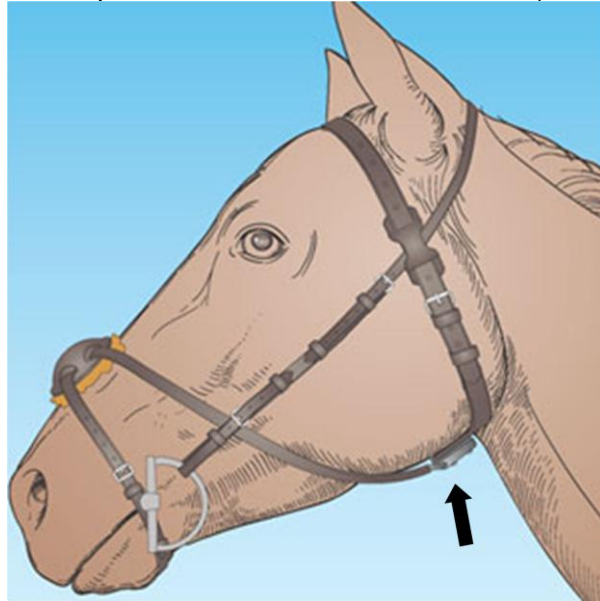


Another possible treatment to correct the position of the soft palate in horses with DDSP is the use of an external device that makes external pressure in the intermandibular space, moving the larynx dorsally and rostrally (Figure 6). This is possible by applying upward and forward pressure on the caudal aspect of the thyroid cartilage and on the caudal aspect of the basihyoid bone, respectively (Woodie, Ducharme, Hackett, *et al.*, 2005).

A study was made to test this device and it showed that the use of the throat support device correct DDSP in experimental cases. The results of the use of this device are similar to the results of the tie-forward surgery (Woodie, Ducharme, Hackett, *et al.*, 2005).

The device is now used in races to prevent DDSP and is used as a diagnostic tool (Ducharme, 2012b).

Figure 6: The laryngochoyoid support device positioned on the horse (arrow) (adapted from <http://vet-aire.com/cornell-collar.html>)



The data supporting the nonsurgical options is not enough to draw clear conclusion about all the options, but these treatments may be used as a first approach when the horse doesn't have any anatomical abnormality (Ducharme, 2012b).

One study showed that the use of nonsurgical treatment alone has a 60% success rate, a similar result to the reports that use surgical treatment (Allen, Christley, Birchall, & Franklin, 2011).

#### **2.2.4.2. Surgical management of DDSP**

There are numerous surgical options for correction of DDSP. The success rates vary for each surgical option, with the laryngeal tie-forward procedure being the surgical option with the higher success rate, demonstrated to be 80-82% (Woodie, Ducharme, Kanter, *et al.*, 2005).

##### **2.2.4.2.1. Laryngeal tie-forward procedure**

This surgical procedure was hypothesized as a result of one study by Ducharme (2003) that reported that the resection of the thyrohyoideus muscles results in DDSP during exercise and it could be corrected by placement of sutures replacing the function of these muscles.

The surgery is performed with the horse under general anesthesia and in dorsal recumbency with the head in full extension (Rossignol, Ouachée, & Boening, 2012). After positioning, an endotracheal tube is placed (Ducharme, 2011). The ventral cervical and intermandibular areas extending 10 cm rostral to the basioid bone are prepared aseptically (Ducharme, 2012b) (Figure 7).

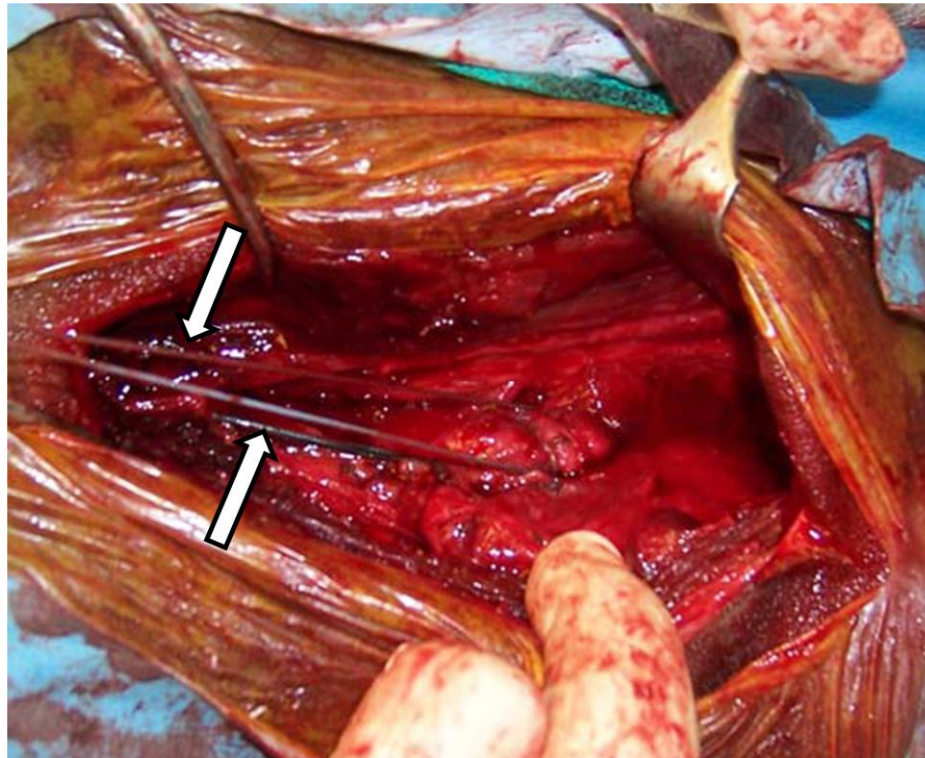


Figure 7: Ventral cervical and intermandibular areas clipped and prepared aseptically (original)



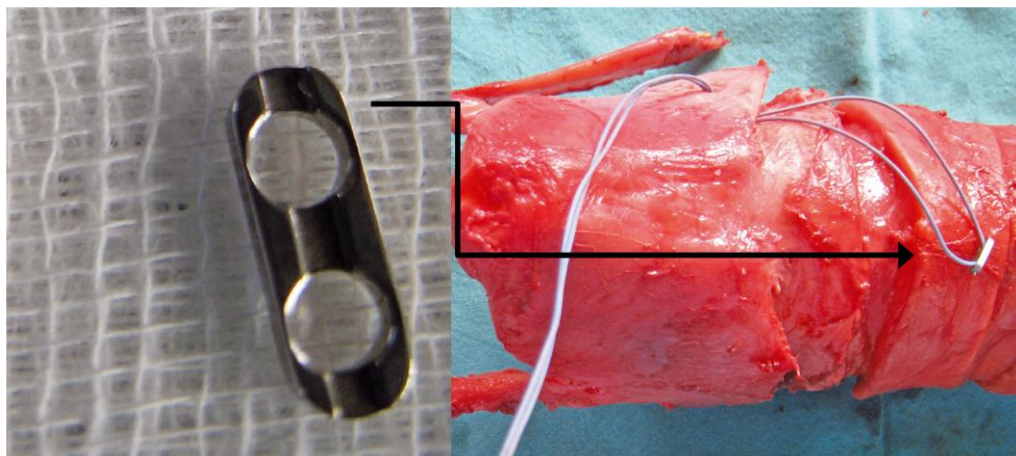
A ventral midline incision of 15 cm is made starting 1 cm caudal to the cricoid cartilage and extending 2 cm rostral to the caudal aspect of the basihyoid bone. After the incision, on the midline, the paired sternothyroideus and omohyoideus muscles (Rossignol *et al.*, 2012) are bluntly separated and dissected free of the dorsolateral aspect of the larynx lateral to the thyrohyoideus muscles. The sternothyroideus muscle tendon of insertion on the thyroid cartilage lamina is undermined and isolated, if not already transected in a prior surgery (Ducharme, 2011). The sutures are first passed in the thyroid cartilage, using size 5 polybend suture inserted at the ventral aspect of the right sternothyroideus tendon and exited from the lateral lamina of the thyroid cartilage. The suture is then passed through the thyrohyoideus muscle, 1 cm rostrally and slightly dorsal from its insertion point. After this, three more bites are placed in the right lamina of the thyroid cartilage, each bite more dorsal than the previous one forming a loop in the thyroid lamina, with each bite 4 mm apart (Ducharme, 2011) (Figure 8).

Figure 8: Surgery incision with the sutures in place (adapted from Ducharme, 2011)



An alternative method is threading through both holes of a 3,5 mm stainless steel button and the ends drawn through the eye of a 48 mm half circle trocar point needle. The needle is passed a single time through the thyroid cartilage, being inserted ventromedial to dorsolateral, 1 cm from the caudal border of this cartilage, at the level of the sternothyroideus tendon insertion. After placing the suture, traction should be applied to the suture strands to pull the metallic button against the medial surface of the caudal aspect of the thyroid cartilage (Rossignol *et al.*, 2012) (Figure 9).

Figure 9: Ventral view of the horse larynx showing placement of the first suture before pulling the metallic button (adapted from Rossignol, Ouachée & Boening, 2012)

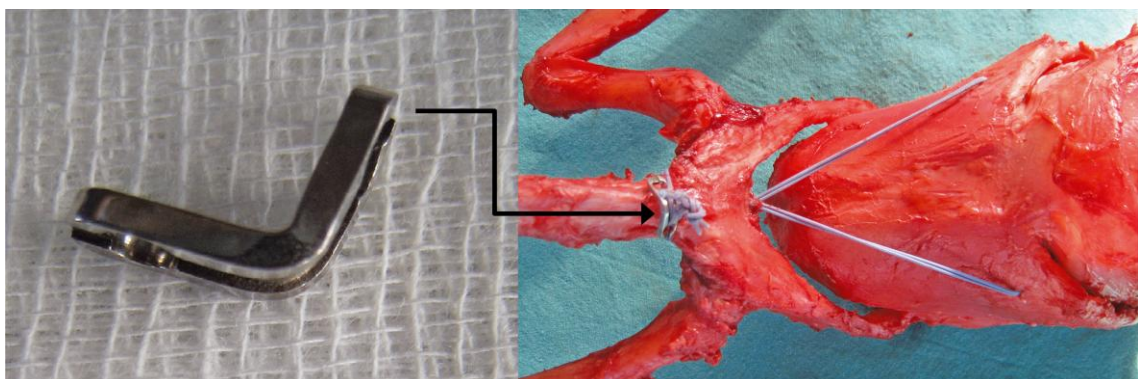


These steps are then repeated on the left side. The sternothyroideus tendon and 2 cm of muscle at its insertion on the thyroid cartilage are transected after the sutures are placed in the thyroid lamina (Ducharme, 2011). The sutures are then passed around the basihyoid using either a 2-0 suture (Rossignol *et al.*, 2012) or a wire passer (Ducharme, 2011). The most dorsal suture on the right side and the most ventral suture on the left are passed dorsal to the basihyoid to exit on the right side of the lingual process where they are tagged with separate hemostats. The most dorsal suture on the left and the most ventral on the right are similarly passed dorsal to the basihyoid, but this time to exit on the left side of the lingual process, and they are also tagged with separate hemostats (Ducharme, 2011). In the procedure described by Rossignol (2012), the 2-0 suture is drawn through the eye of a blunt Deschamps needle and it is inserted rostral to caudal, dorsal to the left side of the lingual process of the basihyoid and the 2-0 suture is used to pull the contralateral polybend suture dorsal to the basihyoid. All these procedures are repeated on the right side.

After the positioning of the sutures, they are tied to mobilize the larynx. To get a better positioning of the larynx and better tightening, the horse's nose is lifted so the head and neck are angled at approximately 90°.

The sutures on each side are tied using a square knot. The ventral sutures are tied so the rostral aspect of the thyroid cartilage is approximately 1 cm rostral to the caudal aspect of the basihyoid. After the sutures are tied, the head is replaced in its normal resting position. Using this procedure it's expected that the larynx moves approximately 2 cm dorsally and 4 cm rostrally (Ducharme, 2011). In the Rossignol (2012) procedure, after the first knot, a bent suture button is incorporated in the subsequent throws on the ventral surface of the lingual process of the basihyoid bone (Figure 10).

Figure 10: Ventral view of the horse larynx and hyoid apparatus showing placement of the bent suture button on the ventral surface of the lingual process of the basihyoid bone (adapted from Rossignol, Ouachée & Boening, 2012)



After the first knot it's important to verify if the thyroid wings are symmetric and if not, the knot should be loosened and tied again (Rossignol *et al.*, 2012). After all the knots are tied, the surgical incision is closed with a 0 poliglecaprone suture reapposing the sternothyroideus muscles. The loose fascia overlying the larynx needs to be incorporated into that closure in order to prevent postoperative seromas. The subcutaneous tissues and skin are closed in a routine manner (Ducharme, 2012b).

In the first two weeks after surgery, the horse should be watered and fed at shoulder height to minimize the stress on the sutures. NSAIDs should be administered for 3 to 5 days. In the first two weeks, the horses are maintained in a box with handwalking once a day. The return to training is set after the two weeks rest (Ducharme, 2012b).

#### **2.2.4.2.2. Staphylectomy**

This procedure was first described for the treatment of an excessively long soft palate, but this condition seems to be present only in neonatal foals (Ahern, 1993). The staphylectomy should be used as a surgical procedure for the resection of a granuloma or cysts from the caudal free edge of the soft palate, but it's important to be careful, as when more than 0,75 cm of the soft palate is removed, the seal between oropharynx and nasopharynx can be disrupted and allow the passage of fluids and food into the nasopharynx (Ducharme, 2012b). The procedure is performed with the horse under general anesthesia and in dorsal recumbency with the head and neck extended. The area is clipped and prepared aseptically for a laryngotomy (Smith & Embertson, 2005). A skin incision of 10-12 cm centered with the cricothyroid space is made and then the sternohyoideus muscles are separated using a curved Metzenbaum or Mayo scissors (Derksen, 1991). After the separation of these muscles, a self-retaining retractor is placed, exposing the cricothyroid membrane, which is incised with a scalpel along the midline, from the junction of the thyroid cartilages to the cricoid cartilage. It is important to cauterize the blood vessel that is incised at the level of the caudal two thirds of the membrane (Ducharme, 2012b). The self-retaining retractor is then placed within the cricothyroid space allowing identification of the caudal free margin of the soft palate rostral to the incision. The endotracheal tube is retracted and the mass or cyst is identified and the caudal free margin of the soft palate is secured with an Allis tissue forceps in the midline and another two forceps are used to secure the soft palate 2 to 2,5 cm lateral to the midline on each side. The caudal free margin of the soft palate is resected using curved Satinsky thoracic scissors. A crescent shaped piece of mucosa is resected, 3 to 4 cm long and 0,5 cm wide on the midline and tapered toward both ends. The laryngotomy incision could be left to heal by second intention or the cricothyroid membrane may be reapposed using 0 polyglatin 910 suture material. The complete closure of the laryngotomy incision is not recommended since it increases morbidity unnecessarily (McIlwraith & Robertson, 1998). The laryngotomy site should be cleaned twice a day for approximately 3 weeks and post-

operative systemic antibiotic and anti-inflammatory therapy should be continued for 7 and 3 days, respectively (Ducharme, 2012b).

For the treatment of DDSP, a laser-assisted staphylectomy is done after a laryngeal tie-forward procedure, when needed. The objective of this procedure after a laryngeal tie-forward is to remove the least amount of mucosa needed to let the epiglottis remain dorsal to the caudal free margin of the soft palate without loss of laryngopalatal seal. The dorsal displacement is corrected with the help of a laryngeal forceps, being possible to observe the redundant palate under the epiglottis that needs to be resected. The intended site of resection is marked prior to using the laser, as the soft palate is an elastic structure and excessive resection could occur. After this, the free margin of the soft palate is lifted and resected. The horse is then treated with broad-spectrum antibiotics and NSAIDs (Ducharme, 2012b).

#### **2.2.4.2.3. Standard myectomy**

This procedure consists on the partial resection of the sternohyoideu and sternothyroideus muscles, the procedure could also include the resection of the omohyoideus muscles, and is performed to control the caudal retraction of the larynx (Anderson, Tulleners, Johnston & Reeves, 1995).

The horse should be treated with NSAIDs and broad-spectrum antibiotics preoperatively. This procedure can be done with the horse standing or under general anesthesia. If the plan is to resect the omohyoideus muscle, the procedure needs to be done with the horse anesthetized and in dorsal recumbency as a more extended dissection is needed to reach this muscle (Ducharme, 2012b).

On the ventral surface of the neck, the hair is clipped and the area is prepared aseptically and local anesthesia is infiltrated along the midline at the junction of the proximal and the middle thirds of the neck (McIlwraith & Robertson, 1998).

The procedure starts with a 10 cm incision on the midline skin and it continues through the cutaneus colli muscles. After the incision, the sternohyoideus muscles are identified and with the help of a curved forceps the sternothyroideus and the sternohyoideus muscles are separated. Both muscles are elevated through the incision and clamped at the proximal and distal ends of the incision. The muscles are transected between the forceps and a section of 6 to 8 cm should be removed. After removing the transected section of the muscles, careful inspection is necessary to be sure that adequate sections of both muscles were removed (McIlwraith & Robertson, 1998).

Resection of the omohyoideus is not recommended, since the removal of a section of this muscle lead to a bigger dead space, causing a higher rate of incisional complications (Ducharme, 2012b).

The incision is closed routinely and a Penrose drain can be placed (Derksen, 1991). A firm bandage is placed around the neck and should be removed 24 hours later along with the drain if one was placed. NSAIDs and antibiotics should be continued after surgery for 3 and 5 to 7 days respectively.

The use of this procedure is decreasing and the use of similar but less invasive procedure is increasing (Ducharme, 2012b).

#### **2.2.4.2.4. Minimally invasive myectomy**

Also known as the Llewellyn procedure, the minimally invasive myectomy consists on the partial sternothyroidectomy and tenectomy. This procedure is one of the first choice procedures because it can be performed in the field and it is simpler than the standard myectomy (Ducharme, 2012b).

The procedure is performed with the horse under general anesthesia and a 5 to 7 cm skin incision is made centered on the cricoid cartilage. The subcutaneous tissue is also incised to expose the sternothyroid muscles which are divided using a curved Mayo or Metzenbaum scissors and the dissection continues dorsally to the sternohyoideus muscle exposing the caudolateral border of the thyroid cartilage. The origin of the tendon of the sternothyroid muscle on the thyroid cartilage is identified and transected 1 cm caudal to its attachment to avoid the caudal laryngeal artery. It is also necessary to be careful to not damage the cricothyroid muscle. With the help of one finger, the sternothyroid muscle is separated from the surrounding fascia and resected more proximally and a 3 cm section of the muscle is removed. All these steps are repeated on the contralateral muscle (McIlwraith & Robertson, 1998).

The incision is closed reapposing the sternothyroid muscles and the skin is closed routinely. Postoperatively NSAIDs are given for 3 to 7 days (Ducharme, 2012b).

### **3. Study: Performance evaluation in Irish racehorses with dorsal displacement of the soft palate following the laryngeal tie-forward procedure**

#### **3.1. Introduction and Main Objective**

DDSP occurs during exercise being a cause of poor performance and exercise intolerance. The laryngeal tie-forward procedure has the highest success rate on the correction of this condition (Woodie, Ducharme, Kanter, *et al.*, 2005), but only one study was performed in the USA to evaluate the significance of this procedure in horse's race performance (Cheetham *et al.*, 2008). This is the first study in Europe evaluating the effect of the laryngeal tie-forward procedure in racing performance. The main objective of this study is to compare the earnings won before and after surgery and evaluate if there's a positive income on racing performance after this procedure.

#### **3.2. Material and Methods**

##### **3.2.1. Study design, population and eligibility criteria**

All horses undergoing the laryngeal tie-forward procedure at Anglesey Lodge Equine Hospital between May 2012 and February 2014 were eligible for inclusion. Medical records of all horses were reviewed. Subject details (name, age, breed, sex, trainer), history and treatment information were obtained.

All horses were subjected to resting endoscopic examination and the definitive diagnosis was obtained by dynamic endoscopic examination showing displacement of the caudal portion of the soft palate dorsal to the epiglottis for at least 8 seconds during gallop. Horses that did not have dynamic endoscopic examination as a method of diagnosis were excluded.

##### **3.2.2. Surgical technique**

All the horses operated were treated with a modified technique of the tie-forward procedure (surgical advancement of the larynx) as described by Cheetham *et al.* (2008). In the original technique, was used a curette to remove the muscle insertion and expose the ventral aspect of the basihyoid bone and a hole was created in this bone through the use of a 3,2 mm drill. The sutures were passed through the hole in the basihyoid bone (Woodie, Ducharme, Kanter, *et al.*, 2005). In the modified technique, one size 5 metric Fiberwire suture is inserted at the ventral aspect of the left sternothyroid tendon insertion and exited from the lamina of the thyroid cartilage and through the thyrohyoideus muscle rostrally and slightly dorsal from its insertion point and the suture is placed three more times through the lamina of the thyroid cartilage, each bite more dorsal than the previous. This procedure is then repeated on the right side. After the placement of the sutures, the sternothyroideus tendon and 2 cm of the muscle at its insertion on the thyroid cartilage are transected. A graft passer is used to pass the dorsal suture on the right side and the ventral suture on the left side dorsal to the

basihyoid bone and exit on the right side of the lingual process and they are tagged with separate hemostats. The process is repeated on the left side. After the positioning of the sutures, the horse head is flexed to an angle of 90° relative to the neck, and the sutures are tied separately using a slip knot (Ducharme, 2011).

After surgery, an endoscopic examination is done to make sure that the soft palate and larynx are in a physiologic position.

### **3.2.3. Performance data**

Race position and earnings by race data were obtained from [www.racingpost.com](http://www.racingpost.com) for each horse. Every horse, to be included in the study, need to have at least data from three races before surgery, been preferable horses with data from four races before surgery when possible. Horses with less than three races before surgery were not included in the study.

Similarly to other study (Barakzai & Dixon, 2005), to distinguish the horses that run but did not win any prize money from the non-finishing horses was assigned a nominal 1 pound (GBP) and 0 GBP respectively.

To allow the comparison of the racing performance before and after surgery, a baseline earning was established. The baseline earning value was calculated using the mean earning of the races before surgery in the case horses.

### **3.2.4. Control selection**

Controls were selected for each treated horse from the date of the third race before surgery, being selected from a different race from the one run by the treated horse. This was made to allow horses, case and control, to have the same position in the selected race.

Control horses were matched to the treated horse by sex, breed and age. The third race before surgery was reported by Cheetham *et al.* (2008) as the point from when the earnings start to decrease after a preliminary evaluation of the race data, being this the point chosen for the selection of the controls. Race data from these horses were aligned temporally with the treated horses in the third race before surgery.

The control horses allow the evaluation of the earnings by race in horses that were not under the laryngeal tie-forward procedure giving a point of comparison between treated horses and non-treated horses.

### **3.2.5. Statistical analysis and reporting**

The performance comparison was made between the first race before surgery, been this race the one with the lowest mean earning, and the third race after surgery, since this is the point from when the horse should be showing a positive response to the surgery.

The effect of the surgery on race position and race earnings was determined using ANOVA with repeated measures, with horse identity as error, race number as factor, and race



position or earnings by race as variables. Differences between control and case horses were estimated by adding the interaction term for “case or control” x “race relative to surgery”.

To the importance of recovery time to racing performance after surgery was done a spearman correlation test, using the earnings of the fourth race after surgery as dependent variable and the time to first race after surgery in days as independent variable.

The differences of earnings by age and sex were evaluated using ANOVA with single measure.

The horses were then divided in two groups: horses aged between 3 and 5 years and horses aged between 6 and 8 years. It was evaluated the importance of recovery time to racing performance after surgery in the same way that it was done before the separation of the horses in the two groups.

Statistical analysis was performed using R 3.1.2. The level of significance was set at  $P < 0,05$ .

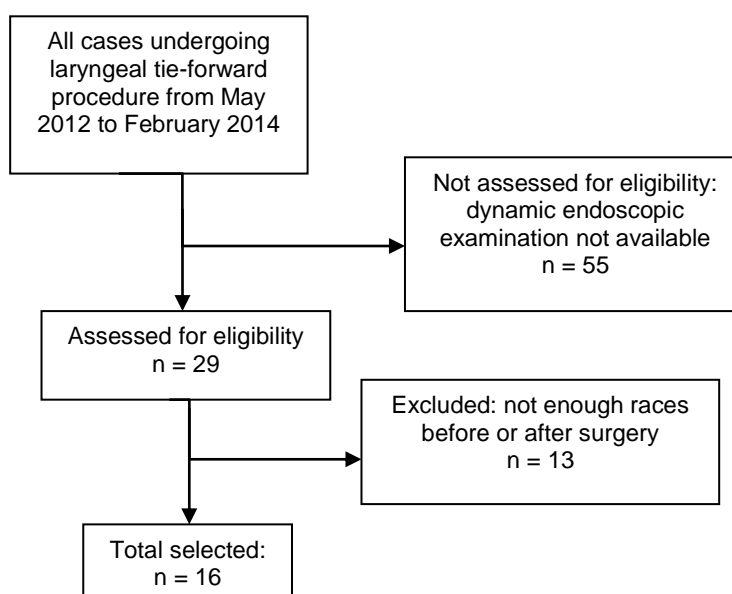
All confidence levels were 95%.

### 3.3. Results

#### 3.3.1. Population

The figure 11 gives a summary of the case selection process. 34,5% of the horses that underwent the laryngeal tie-forward procedure were assessed for eligibility and 16 of 29 horses were included, The population consisted of 16 thoroughbreds, 14 males and 2 females. The mean  $\pm$  s.d. age at the date of surgery was  $5,7 \pm 2,7$  years. These consisted of 3 three-year-olds, 3 geldings and 1 mare, 4 five-year-olds geldings, 3 six-year-olds geldings, 4 seven-year-olds, 3 geldings and 1 mare, and 2 eight-year-olds geldings.

Figure 11: Flow diagram of case selection (original)



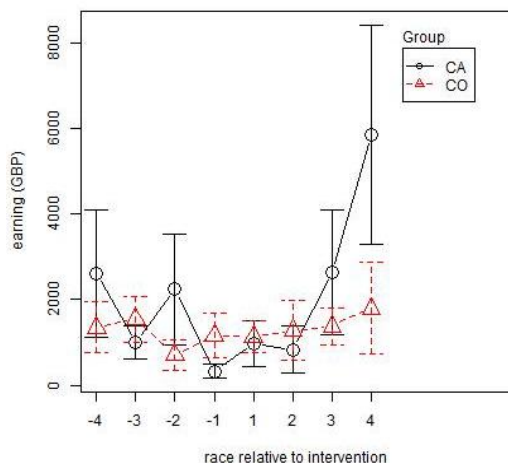
### 3.3.2. Effect of surgery on racing performance

The between groups test indicates that the difference between case and control in the first race before surgery and the third race after surgery is significant ( $P = 0,016$ ). The earnings and race position change over time, showing that exists a time effect in the performance of the horses ( $P = 0,0138$ ). The numerical summary of earnings by race for the treated horses is shown in table 1. In table 1 and in graphic 1 it's possible to see that the earnings baseline is slightly over the 2000 GBP in the cases, and the mean decreases to 333 GBP in the first race prior to surgery. After the recovery period and two races after surgery, the mean earnings are already at the baseline level, increasing to 5855 GBP in the fourth race. As seen in the graphics 1 and 2, the cases are improving differently from controls over time ( $P = 0,0208$ ), once the controls stay more or less in the same range of results and the cases improve the race position to the same level of the controls and triple the baseline earnings.

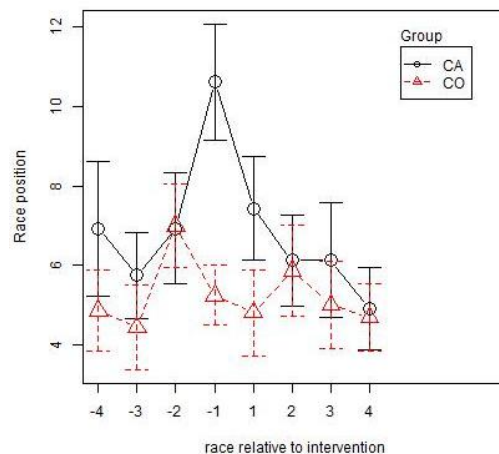
Table 1: Earning (GBP) data for the cases and controls for each race

Race		-4	-3	-2	-1	1	2	3	4
Cases	Minimum	0	1	0	0	0	0	1	0
	Mean	2609,64	999,28	2238,30	332,76	966,32	835,84	2639,09	5854,63
	s.d.	5548,53	1533,12	5156,00	647,53	2133,01	2215,36	5652,59	9582,28
	Median	699,19	299,28	1	1	1	1	583,33	950
	Maximum	20313	5610	19817	1951	7012	8913	21667	27083
Controls	Minimum	0	0	0	0	0	0	0	0
	Mean	1348,33	1542,32	709,56	1168,32	1139,13	1288,52	1378,96	1792,44
	s.d.	2309,62	2101,41	1431,65	2094,48	1462,95	2807,21	1730,56	3854,66
	Median	288,60	424,80	1	1	215,25	244,40	1001,58	1
	Maximum	6900	5610	4488	5890	4106	11196	6333	11792

Graphic 1 Comparison between mean earnings (GBP) for each race relative to surgery in cases (CA) and controls (CO) (original)



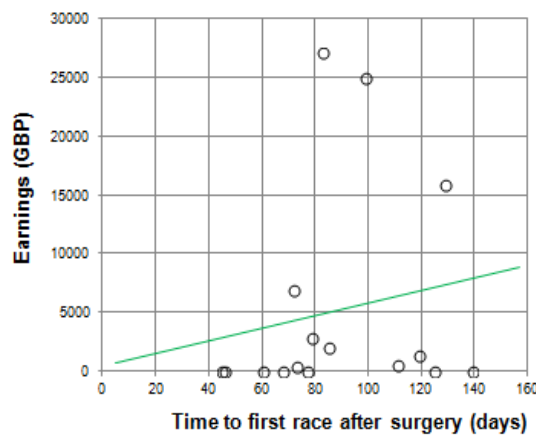
Graphic 2: Comparison between race position for each race relative to surgery in cases (CA) and controls (CO) (original)



### 3.3.3. Effect of recovery time in earnings

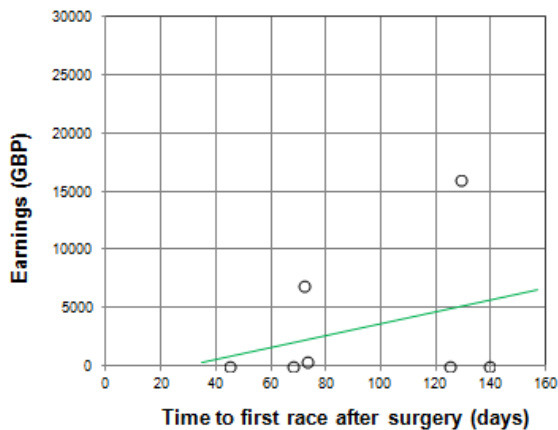
The graphic 3 shows the earnings achieved by each horse in the fourth race after surgery and the recovery time that the same horse needed until the first race after surgery. Although not significant ( $P=0,32$ ), it's possible to see in graphic 3 that more time between surgery and first race after surgery is better than a short time of recovery period ( $\rho=0,287$ ), once horses with a bigger recovery time have a better earnings. It is also possible to see that the better earnings in the fourth race after surgery are from horses that have a recovery period between 80-100 days.

Graphic 3: Spearman correlation test between earnings (GBP) and time to first race after surgery (days) with linear regression in case horses (original)

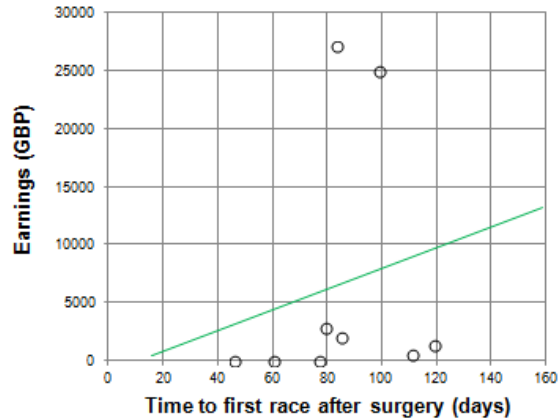


For a better understanding of the effect of recovery time in the racing performance, two groups were made, separating the younger horses from the older. In the group 1 are the horses whose age is between 3 and 5 years and in group 2 are the horses whose age is between 6 and 8 years.

Graphic 4: Spearman correlation test between earnings (GBP) and time to first race after surgery (days) with linear regression in group 1 horses (original)



Graphic 5: Spearman correlation test between earnings (GBP) and time to first race after surgery (days) with linear regression in group 2 horses (original)



As is possible to see in the graphic 4, group 1 has better results with longer recovery periods ( $P=0,06$ ). In this group, the horse with the better earning in the fourth race after surgery has a recovery period between 120-140 days. The same is possible to see in graphic 5 for the group 2 ( $P=0,299$ ). The horse with the better result in group 2 has a recovery period between 80-100 days.

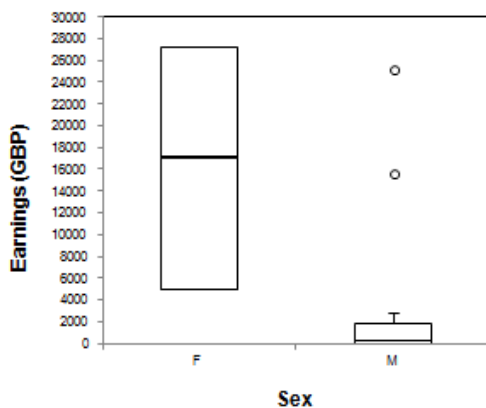
Observing both graphics 4 and 5, it's also possible to see that group 2 have better earnings than group 1.

The positive correlation in both group 1 ( $P=0,913$ ) and group 2 ( $P=0,471$ ) is not significant.

### 3.3.4. Earnings by sex

The difference between sexes is not significant ( $P=0,07$ ), but it's possible to see in graphic 6 that the females have better results in the fourth race after surgery than males. The means of the earnings in the fourth race after surgery for each gender are shown in table 2. The difference for the controls is also not significant ( $P=0,562$ ), but in the controls, the males have better results, as shown in graphic 7. Analyzing the means of cases and controls, it's possible to see that the males, in both cases and controls, have a similar mean earning in the fourth race after surgery. In the females the means are very different, being the cases much higher than controls.

Graphic 6: Comparison of mean earnings (GBP) at the fourth race after surgery between sexes in case horses (original)



Graphic 7: Comparison of mean earnings (GBP) at the fourth race after surgery between sexes in control horses (original)

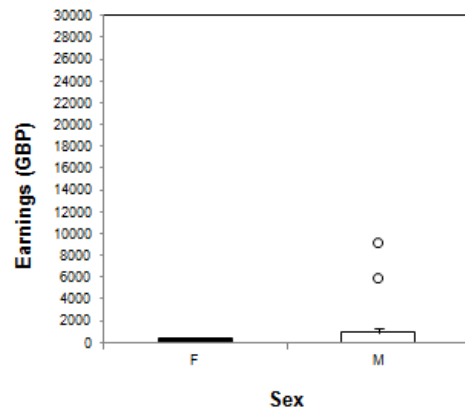


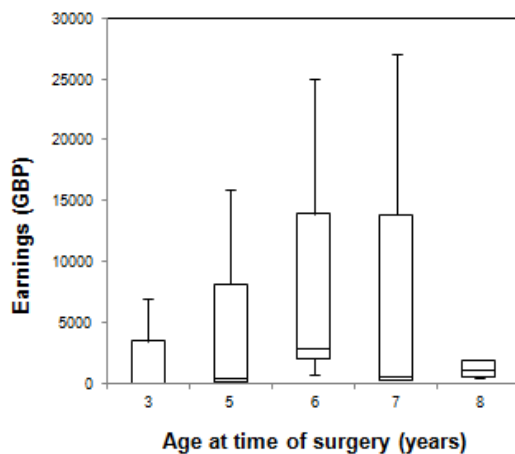
Table 2: Mean earning (GBP) data for the fourth race after surgery in case and control horses divided by sex

	Sex	Mean $\pm$ s.d.
Cases	Female	16991,67 $\pm$ 14271,77
	Male	3998,46 $\pm$ 7980,47
Controls	Female	250,50 $\pm$ 352,85
	Male	2072,79 $\pm$ 4153,00

### 3.3.5. Earnings by age

The difference between ages is not significant ( $P=0,832$ ), but it's possible to see in graphic 8 that the horses that were under surgery at the age of 6 and 7 years old have better results than the horses in early and older ages. Observing the means by age of the earnings in the fourth race after surgery, the horses that have better results are the horses that were under surgery at the age of 6, as it's possible to see in table 3. The difference in controls, shown in graphic 9, is also not significant ( $P=0,514$ ). Analyzing the means of the earnings in the fourth race after surgery by age in cases and controls is possible to see that the mean is higher in the cases at every age.

Graphic 8: Mean earnings (GBP) at the fourth race after surgery by age in case horses (original)



Graphic 9: Mean earnings (GBP) at the fourth race after surgery by age in control horses (original)

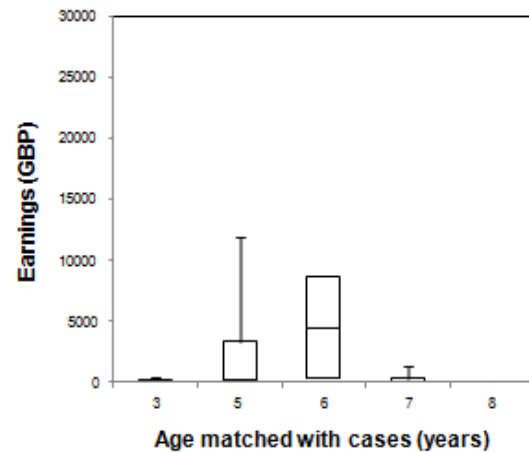


Table 3: Mean earning (GBP) data by age in case and control horses

	Age	Mean $\pm$ s.d.
Cases	3	2300,67 $\pm$ 3983,14
	5	5421,67 $\pm$ 9089,18
	6	9715,28 $\pm$ 13257,60
	7	9217,00 $\pm$ 15475,28
	8	1000,50 $\pm$ 1413,51
Controls	3	167,33 $\pm$ 288,10
	5	3117,98 $\pm$ 5907,29
	6	4512,50 $\pm$ 5815,95
	7	325,70 $\pm$ 650,07
	8	-

### 3.4. Discussion

It was referred that the laryngeal tie-forward procedure allows horses to return to a racing performance equal to preoperative baseline levels. These data support this hypothesis and also give the idea that the horses were not showing the total potential, once they triple the mean earning four races after surgery. Other study also demonstrates that the laryngeal tie-forward procedure returns racing performance to preoperative baseline (Cheetham *et al.*, 2008). This could be explained once the horses with DDSP could have PI prior to this condition, and this could limit the performance of the horse, placing them running in lower category races with lower associated earnings.

All the horses included in the study were Thoroughbreds. As shown in other studies, there were no significant anatomical differences in the distance between the caudal aspect of the basihyoid bone and the rostral and cranial aspects of the thyroid and cricoid cartilages, respectively, between Thoroughbreds and Standardbreds, and the surgery technique is the same for the two breeds (Woodie, Ducharme, Kanter, *et al.*, 2005) and there were some significant differences in the preoperative position of the thyrohyoid-thyroid cartilage articulation and in the ossification of the thyroid cartilage, being more caudal and dorsal, respectively, in Standardbreds (Ortved *et al.*, 2010). The differences in the earnings are not significant between these two breeds (Cheetham *et al.*, 2008).

Similarly to other study (Barakzai & Dixon, 2005), in this study the method for evaluating the racing performance was the earnings, because it takes into account the horse performance in a race relative to the other racing horses and also to the race itself. To distinguish the horses that ran but did not win any prize money from the non-finishing horses a nominal 1 GBP and 0 GBP were assigned respectively.

A beneficial point of this study is that all the surgeries were performed by the same surgeon, showing that the technique applied by this specific surgeon corrects DDSP, but for a better

analysis of this surgical procedure, surgeries done by other surgeons should be included in the study, allowing a better extrapolation of the results. A limitation of the study is that the percentage of recurrence of DDSP after surgery in these horses is not known. This recurrence is well known by equine surgeons although there are no published reports on the prevalence of this condition (Woodie, Ducharme, Kanter, *et al.*, 2005). In one study done by Woodie *et al.* (2005), the percentage of recurrence is approximately 6%. One way to evaluate the recurrence of DDSP is to establish as a follow-up exam a dynamic endoscopic examination. This could be done 6 months after surgery and once a year after that.

The control selection is a main difficulty in this study, once the preferable controls are horses with a definitive diagnose of DDSP that were not undergoing the laryngeal tie-forward procedure, showing the evolution of the horses results without the correction of this condition, but this is a difficult goal to achieve in the racing industry, once the horses are raced to win.

As shown by Allen & Franklin (2013), prior to DDSP all horses showed some grade of PI, concluding that this condition could be an early stage of DDSP. This leads to the idea that the laryngeal tie-forward procedure could be done in an early stage, preventing the drop of performance showed in DDSP cases, allowing horses to achieve the full performance potential in an early age.

In this study ideal age to perform this surgical procedure was not investigated, but it was possible to see that the horses that were under surgery at the age of 6 had better results four races after surgery.

Another factor that was not investigated in this study was the recovery time. It is easy to understand that a longer recovery time is better than a too short recovery time, but the studies to define what is the ideal recovery time for this surgery were not done. Ducharme (2011) recommended that the return to training was 2 weeks after surgery. In this study, it's possible to see that the horses with better results had a recovery time between 80 – 100 days.

This is the first study in Europe investigating the significance of the laryngeal tie-forward procedure in horse's race performance and only one other study was done in the USA (Cheetham *et al.*, 2008). It demonstrates that the laryngeal tie-forward procedure is an appropriate technique for the correction of dorsal displacement of the soft palate in racehorses. In order to achieve a better understanding of the factors that influence the success of this procedure in racing performance, a study with more horses should be done, trying to evaluate the differences between horses with different recovery times and horses that were under surgery at different selected ages. Another thing that should be interesting to analyze is the response of horses that were under the laryngeal tie-forward procedure at different stages of DDSP and PI, trying to evaluate the best time to perform this surgery.

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## Annex

### Annex 1: Date of surgery and age at time of surgery of the case horses

<b>Case horse</b>	<b>Date of surgery</b>	<b>Age at time of surgery</b>
Nr 1	21 March 2013	5
Nr 2	25 June 2013	5
Nr 3	28 June 2013	5
Nr 4	06 June 2013	7
Nr 5	08 July 2013	7
Nr 6	29 August 2013	6
Nr 7	27 November 2013	7
Nr 8	03 September 2013	5
Nr 9	18 November 2013	3
Nr 10	02 January 2014	3
Nr 11	24 September 2013	8
Nr 12	30 January 2014	6
Nr 13	20 February 2014	3
Nr 14	15 January 2014	8
Nr 15	25 July 2013	7
Nr 16	04 December 2013	6

## Annex 2: Race data of the “case” racehorses

Selected race for the study

- Border line between races occurring before and after surgery

### Case horse nr 1 race record

- 7-y-o
- Trainer: Edward P Harty

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
06Nov14	<b>Thu 24Sft</b> HcCh 5K	11-10	<b>PU/12</b> (Embracing Change 11-6) t 20/1	Mark Walsh	107
16May14	<b>Klb 25Gd</b> HcCh 9K	10-12	<b>PU/10</b> (Raajih 11-10) t 11/1	Mark Walsh	108
19Jan14	<b>Fai 21.5Sft</b> HcCh 5K	11-5	<b>PU/15</b> (Hold Em Cowboy 10-4) t 13/2	A P McCoy	109
12Dec13	<b>Trm 21Y</b> Ch 4K	11-12	<b>2/6</b> (2L Pals Leg 11-5) t 9/2	Niall P Madden	108
21Nov13	<b>Thu 24Y</b> HcCh 5K	11-10	<b>UR/18</b> (A Decent Excuse 10-9) t 10/1	Niall P Madden	108
09Nov13	<b>Naa 20Y/Sft</b> NvHcCh 5K	11-10	<b>RR/14</b> (Golden Ticket 11-5) t 8/1	Niall P Madden	108
27Oct13	<b>Wex 17Sft</b> Ch 5K	11-11	<b>F/12</b> (Hospital 11-11) t 14/1	Robbie Power	—
10Oct13	<b>Trm 22Gd</b> Ch 4K	11-10	<b>3/8</b> (4½L Coldstonesober 11-12) t 7/1	Niall P Madden	—
02Oct13	<b>Sli 20Hy</b> Ch 4K	11-10	<b>6/12</b> (25L Coolking 11-12) 20/1	Niall P Madden	—
29Jul13	<b>Gal 16Gd</b> HcH 8K	10-10	<b>12/20</b> (33L Aladdins Cave 10-13) 33/1	Mark Walsh	107
09Mar13	<b>Gow 16Hy</b> HcH 5K	11-12	<b>PU/14</b> (Wing It Lady 10-8) 8/1	Mark Walsh	109
09Jan13	<b>Fai 20Hy</b> MdH 4K	11-1	<b>10/12</b> (41L Carsonstown Bridge 11-4) t 9/4	Mark Walsh	110
16Dec12	<b>Nav 16Hy</b> MdH 5K	11-9	<b>2/10</b> (11L Wingtips 11-9) t 7/1	Mark Walsh	—
25Nov12	<b>Nav 16Hy</b> MdH 7K	11-9	<b>5/15</b> (62L Don Cossack 11-12) 16/1	Mark Walsh	—
07Nov12	<b>Fai 16Sft</b> MdH 4K	11-4	<b>6/14</b> (10L Blacklough 11-9) 20/1	Mark Walsh	—

### Case horse nr 2 race record

- 7-y-o
- Trainer: T J Taaffe

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
30Apr14	<b>Pun 25Gd/Y</b> ChG1 100K	11-10	7/9 (17½L Boston Bob 11-10) 9/1	A P McCoy	162
03Apr14	<b>Ain 25Gd</b> C1ChG1 84K	11-7	3/6 (3L Silviniaco Conti 11-7) 25/1	A P McCoy	149
15Feb14	<b>Gow 20Hy</b> ChG2 21K	11-8	1/4 (¾L Turban 11-3) 10/1	Brian O'Connell	150
16Jan14	<b>Thu 20Sft</b> ChG2 20K	11-8	6/7 (19½L Texas Jack 11-8) 5/1	Paul Townend	151
02Nov13	<b>Dro 20Sft</b> ChG2 26K	11-9	F/7 (Rolling Aces 11-5) 20/1	Paul Townend	143
23Apr13	<b>Pun 25Sft</b> NvChG1 40K	11-1	5/8 (46L Mount Benbulbin 11-10) 16/1	Barry Geraghty	146
07Apr13	<b>Lim 24Gd</b> NvChG2 19K	10-13	1/3 (5L Shabra Charity 10-10) 2/5F	Bryan Cooper	146
14Mar13	<b>Chl 20GS</b> C1NvChG2 56K	11-3	10/13 (34L Beneficient 11-4) 22/1	Davy Russell	146
26Dec12	<b>Lim 19.5Hy</b> NvChG2 20K	10-9	1/5 (8L Snooze 11-6) 9/4	Andrew J McNamara	143
28Oct12	<b>Gal 17Sft</b> NvChG3 16K	10-3	2/5 (2L Twilight 11-0) 5/2	Bryan Cooper	—
14Oct12	<b>Lim 19.5Sft/Hy</b> Ch 7K	10-13	1/15 (6½L Johannisberger 11-11) 4/1	Andrew J McNamara	—
24Sep12	<b>Bal 17Y/Sft</b> Ch 4K	10-12	7/14 (9¼L Special Tiara 11-10) 8/1	Andrew J McNamara	—
14Mar12	<b>Chl 16.5Gd</b> C14yHcHG3 34K	11-1	9/24 (13L Une Artiste 10-8) 16/1	Brian Hayes	136
19Jan12	<b>Thu 16Sft</b> MdH 4K	10-5	1/17 (4½L Lamb Or Cod 11-4) 7/2	Brian Hayes	—
31Dec11	<b>Pun 16Hy</b> 3yMdH 5K	11-0	3/11 (6½L Shadow Catcher 11-0) 8/1	Robbie Power	—
04Dec11	<b>Fai 16Sft/Hy</b> 3yHG3 16K	10-9	7/9 (14½L Sam Bass 10-13) 25/1	Mark Walsh	—
11Aug11	<b>Bev 16Sft</b> C4Hc 4K	8-12	6/8 (56L Beat The Shower 9-4) 8/1	Graham Gibbons	78
15Jul11	<b>Hay 14GF</b> C43yHc 5K	9-5	3/5 (14L Colour Vision 9-13) 6/1	Jamie Spencer	80
14May11	<b>Nmk 12GF</b> C33yHc 8K	8-9	4/5 (11L Glencadam Gold 9-1) 8/1	Chris Catlin	83
04May11	<b>Chs 12.5GF</b> C33yHc 9K	9-7	5/8 (7L Brown Panther 8-9) 9/2	Jamie Spencer	85
15Apr11	<b>Nby 10GF</b> C33y 7K	8-13	4/5 (14L Cai Shen 8-13) 16/1	Jamie Spencer	88
15Oct10	<b>Nmk 8Gd</b> C42yMd 5K	9-3	1/18 (hd El Muqbil 9-3) 11/1	Frankie Dettori	—
29Sep10	<b>Sal 8Sft</b> C42yMd 4K	9-3	4/12 (10½L Chain Lightning 9-3) 7/1	Neil Callan	—
17Sep10	<b>Nby 8Gd</b> C22y 11K	8-12	8/10 (9¼L Moriarty 9-2) 33/1	Jamie Spencer	—

### Case horse nr 3 race record

- 7-y-o
- Trainer: T J Taaffe

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
27Dec14	<b>Lim 19.5Sft/Hy</b> HcCh 27K	11-7	10/15 (42L Page Turner 10-5) 9/1	Mr Derek O'Connor	140
01Nov13	<b>Dro 20Y</b> Ch 7K	11-11	1/7 (5L Howwoulduno 11-6) 5/2F	R Walsh	—
06May13	<b>Dro 22Gd</b> H 8K	11-12	2/4 (7½L Bondage 11-8) 10/11F	Bryan Cooper	130
09Apr13	<b>Gow 20Gd</b> HcH 8K	11-5	1/14 (2L Gates Of Rome 11-12) 9/2	Bryan Cooper	123
16Mar13	<b>Lim 19Hy</b> MdH 5K	11-12	1/11 (9L Not For You 11-12) 8/13F	A E Lynch	—
19Feb13	<b>Nav 20Hy</b> MdH 7K	11-10	2/12 (3¼L Mullaghanoe River 11-10) 7/2	Andrew J McNamara	—
21Oct12	<b>Naa 19Hy</b> NHF 5K	11-10	2/13 (4½L Road To Riches 11-7) 6/1	Robbie McNamara	—
27Sep12	<b>Per 16.5Gd</b> C6NHF 2K	11-9	3/11 (2¼L Our Joey 11-2) 9/1	Robbie Colgan	—
15Jun12	<b>Clo 16Sft</b> NHF 3K	11-7	1/11 (½L Regal One 11-0) 5/1	Ms K Walsh	—

### Case horse nr 4 race record

- 9-y-o
- Trainer: Martin Hill

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
08May14	<b>Nab 22Hy</b> C5SIHcH 2K	10-7	<b>7/12</b> (68L Thedeboftheyear 11-0) 10/1	Miss Alice Mills	83
19Apr14	<b>Nab 22Gd</b> C5NvHcH 2K	11-4	<b>8/15</b> (30L Polo Springs 10-9) 20/1	Hadden Frost	91
19Dec13	<b>Exe 23.5Sft</b> C4MdH 3K	11-0	<b>10/11</b> (120L Tagrita 10-7) 80/1	Hadden Frost	—
06Oct13	<b>Csg 24Gd/Y</b> PTP	12-2	<b>8/17</b> (15½L Adamstown 12-2) 5/1	J C Barry	—
29Sep13	<b>Rth 24GF</b> PTP	12-2	<b>1/12</b> (2½L Valentino's Choice 12-2) 7/1	J C Barry	—
23Aug13	<b>Klb 19.5Gd</b> MdH 5K	11-4	<b>10/16</b> (36L Croghill Tuppence 11-2) t 66/1	Michael Butler	—
13Feb13	<b>Thu 22Hy</b> MdH 4K	11-1	<b>PU/17</b> (Are Ya Right Chief 11-12) t 100/1	Ian McCarthy	—
27Jan13	<b>Leo 16Sft/Hy</b> MdH 5K	11- 12	<b>18/20</b> (85L Legal Exit 11-12) 66/1	Paddy Merrigan	—
25Nov12	<b>Nav 16Hy</b> MdH 7K	11-9	<b>15/15</b> (146L Don Cossack 11-12) 50/1	Ian McCarthy	—
19May12	<b>Nec 24Sft/Hy</b> PTP	11-9	<b>PU/16</b> (Greenhall Lad 12-0) 10/1	David Joseph O'Leary	—
08Oct11	<b>Fai 16Gd</b> NHF 4K	12-0	<b>10/16</b> (42L King Malik 11-11) t 16/1	Mr M J O'Connor	—
24Sep11	<b>Nav 16Gd</b> NHF 4K	12-0	<b>6/11</b> (10½L Paudi The Punter 11-11) 8/1	Mr M J O'Connor	—



### Case horse nr 5 race record

- 9-y-o
- Trainer: A L T Moore

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
14Dec14	<b>Nav 20Y/Sft</b> HcCh 16K	10-3	2/13 (11L Mount Colah 11-2) t 7/1	D J Casey	124
30Oct14	<b>Clo 20Y</b> Ch 8K	11-5	1/4 (3L Too Scoops 10-13) t 5/2	D J Casey	121
29Sep14	<b>Ros 21Gd</b> HcCh 8K	11-7	2/8 (2¾L Dushrembrandt 10-11) t 9/2	D J Casey	118
09Aug14	<b>Klb 20Y</b> HcCh 8K	10-13	4/7 (14L Quarton 10-1) t 9/2	D J Casey	119
18Jul14	<b>Klb 25Gd</b> HcCh 27K	10-9	3/12 (6¼L Caim Hill 11-4) t 13/2	D J Casey	118
23Jun14	<b>Klb 20Gd</b> HcCh 7K	11-8	1/9 (9L Ballysteen 11-3) t 12/1	Mark Walsh	111
04Jun14	<b>Pun 22Gd/Y</b> HcCh 5K	11-7	14/22 (54L Close Review 10-7) t 14/1	D J Casey	113
13Apr14	<b>Trm 22Y</b> HcCh 9K	11-1	4/14 (4¼L Notimetoserve 9-13) t 12/1	Gareth Malone	113
01Mar14	<b>Nav 17Sft/Hy</b> HcCh 5K	11-12	9/16 (38L Refused A Name 10-12) t 16/1	D J Casey	116
08Dec13	<b>Pun 22Gd/Y</b> HcCh 12K	10-4	7/16 (30L Daring Article 10-3) t 11/2	D J Casey	118
28Oct13	<b>Gal 22Hy</b> HcCh 12K	10-8	6/14 (26L Count Salazar 10-13) t 7/1	D J Casey	119
21Jun13	<b>Dro 20GF</b> HcCh 11K	10-2	15/18 (64L Johannisberger 10-9) t 5/1F	D J Casey	120
13May13	<b>Kln 22Sft</b> HcCh 12K	10-5	3/11 (5¼L Miss Pepperpot 9-13) t 11/2	D J Casey	119
03Apr13	<b>Dpt 28Gd</b> HcCh 13K	11-2	4/15 (27L Pineau De Re 11-7) t 5/1F	D J Casey	120
10Mar13	<b>Naa 24Sft</b> HcCh 21K	10-0	4/17 (10½L Rich Revival 10-9) t 6/1J	D J Casey	120
03Mar13	<b>Leo 21Y</b> HcCh 19K	10-8	UR/20 (He'llberemembered 10-13) t 5/1J	D J Casey	120
13Jan13	<b>Nav 20Hy</b> HcCh 14K	10-7	2/11 (hd Rich Revival 10-13) t 10/1	D J Casey	116
06Dec12	<b>Clo 20.5Sft</b> HcCh 5K	11-8	1/15 (½L Killcara Boy 10-10) t 7/1	D J Casey	112
12Oct12	<b>Trm 22Sft</b> HcCh 5K	11-8	3/12 (12½L Bangonform 10-11) t 6/1	D J Casey	112
07Sep12	<b>Klb 25Gd</b> HcCh 8K	11-3	7/14 (20L Liberty Counsel 11-8) t 8/1	D J Casey	113
20Aug12	<b>Trm 22Sft</b> HcCh 8K	10-13	2/6 (1¾L Agus A Vic 11-2) t 5/2F	D J Casey	110
07May12	<b>Dro 20Gd</b> HcCh 9K	9-13	11/15 (44L Any Bets 9-3) t 13/8F	D J Casey	110
15Apr12	<b>Trm 22Gd</b> HcCh 9K	10-7	1/10 (4¾L Fairwood Massini 10-3) t 3/1F	Patrick Mangan	101
03Mar12	<b>Nav 17Sft</b> HcCh 5K	10-12	6/12 (23L Hold Em Cowboy 9-7) 6/1	D J Casey	102
09Feb12	<b>Thu 16Sft/Hy</b> Ch 6K	11-12	5/14 (25L Shootin The Breeze 11-12) 16/1	D J Casey	—
27Nov11	<b>Nav 17Sft/Hy</b> Ch 9K	11-12	7/10 (61L Flemenstar 11-12) 25/1	D J Casey	—
14Nov11	<b>Lim 17Y/Sft</b> Ch 7K	11-12	5/16 (32L Rockyaboya 11-12) 10/1	D J Casey	—
15May11	<b>Kln 17Gd/Y</b> HcH 22K	10-0	17/18 (53L Princeton Plains 10-3) t 20/1	Alan Crowe	110
09Apr11	<b>Trm 16Gd</b> MdH 4K	11-4	1/15 (4L Raggletagglegypsy 11-4) 13/8F	Alan Crowe	—
17Mar11	<b>Wex 16Sft</b> MdH 4K	11-4	2/9 (9L Bleakfield Lady 10-13) 2/5F	Mark Walsh	—
16Feb11	<b>Pun 16Hy</b> MdH 3K	11-3	2/21 (hd O Fortuna 10-13) 10/1	D J Casey	—
30Dec10	<b>Leo 16Sft/Hy</b> 4yMdH 7K	11-7	8/21 (28L Hidden Universe 11-7) 33/1	D J Casey	—

### Case horse nr 6 race record

- 8-y-o
- Trainer: Ms Sandra Hughes

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
30Apr14	<b>Pun 20Gd/Y</b> H 12K	11-12	<b>2/10</b> (6L Le Vent D'Antan 11-12) 16/1	Mark Enright	123
20Apr14	<b>Fai 16Gd/Y</b> MdH 6K	11-12	<b>1/25</b> (1L Tawseef 11-12) 4/1	Mark Enright	—
29Mar14	<b>Nav 16Sft/Hy</b> MdH 5K	11-12	<b>2/26</b> (nse Baby King 11-12) 4/5F	Mark Enright	—
02Mar14	<b>Leo 20Sft</b> MdH 5K	11-12	<b>2/15</b> (¾L Is Love Alive 11-11) 3/1	Roger Loughran	—
25Jan14	<b>Leo 20Sft</b> MdH 5K	11-12	<b>3/17</b> (2¾L Mister Nibbles 11-9) 16/1	Roger Loughran	—
27Dec13	<b>Leo 16Sft</b> MdH 6K	11-12	<b>4/8</b> (23L Double Irish 11-12) 20/1	Bryan Cooper	—
24Apr13	<b>Pun 18Sft</b> NHF 5K	12-0	<b>14/15</b> (133L Lots Of Memories 11-11) 20/1	Robbie McNamara	—
27Jan13	<b>Leo 16Sft/Hy</b> NHF 4K	11-11	<b>6/10</b> (13½L Blackmail 11-12) 6/1	M P Fogarty	—
28Dec12	<b>Leo 16Sft</b> NHF 5K	11-11	<b>2/8</b> (2L Tangled Web 11-11) 12/1	M P Fogarty	—

### Case horse nr 7 race record

- 9-y-o
- Trainer: Mrs John Harrington

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
01Nov14	<b>Dro</b> 20Y ChG2 27K	11-1	3/3 (63L Don Cossack 11-12) t 9/1	Robbie Power	138
12Oct14	<b>Lim</b> 19.5Gd Ch 12K	11-10	1/4 (5L Seefood 11-7) t 5/1	Robbie Power	138
04Oct14	<b>Gow</b> 20Y ChG2 21K	10-10	3/6 (11L Sizing Europe 11-10) t 12/1	Robbie Power	138
17Sep14	<b>Lis</b> 24Gd HcCh 80K	10-11	12/18 (38L Your Busy 9-12) t 8/1	Robbie Power	139
30Jul14	<b>Gal</b> 22Gd HcCh 100K	10-5	2/22 (11L Road To Riches 10-11) t 16/1	Robbie Power	136
02May14	<b>Pun</b> 21Gd/Y HcCh 27K	11-1	1/15 (½L She's Got Grit 10-6) t 7/1	Robbie Power	128
21Apr14	<b>Fai</b> 20Gd/Y ChG3 18K	10-11	3/12 (¾L Une Artiste 11-0) t 9/1	Robbie Power	129
02Mar14	<b>Leo</b> 18Sft H 10K	10-12	5/6 (16½L Sailors Warn 11-0) 20/1	Robbie Power	—
19Feb14	<b>Pun</b> 20Hy H 10K	10-11	5/6 (75L Upsie 11-3) 7/1	Robbie Power	—
29Aug13	<b>Kln</b> 20.5Gd NvCh 6K	11-5	2/10 (¾L Spring Heeled 11-5) 6/1	Robbie Power	129
20Jun13	<b>Leo</b> 14GF 5K	10-9	8/12 (6¾L Digeanta 11-4) t 11/4	Miss K Harrington	—
29May13	<b>Pun</b> 18GF Ch 10K	10-6	2/9 (11L Tribes And Banner 11-2) t 13/8F	Robbie Power	130
04May13	<b>Lim</b> 17Y Ch 8K	11-5	1/15 (8L Six Stone Ned 11-12) t 11/10F	Robbie Power	126
02Apr13	<b>Fai</b> 20Y ChG3 17K	10-11	3/12 (8½L Nadiya De La Vega 11-0) t 8/1	Davy Condon	117
26Jan13	<b>Leo</b> 16Hy HcH 48K	10-12	21/28 (75L Abbey Lane 10-8) 20/1	Robbie Power	129
29Dec12	<b>Leo</b> 20Sft HG3 21K	11-2	2/11 (6½L Zuzka 11-5) 12/1	Robbie Power	130
18Oct12	<b>Pun</b> 18Hy HG3 14K	11-3	4/8 (30L Tarla 10-13) 9/2	Robbie Power	130
05Oct12	<b>Gow</b> 20Gd H 7K	11-5	1/8 (6L Earlson Gray 11-5) 2/1F	Robbie Power	123
23Sep12	<b>Gow</b> 20Gd H 10K	11-3	2/12 (1½L Blazing Tempo 11-7) 5/1	Robbie Power	122
18Jul12	<b>Kln</b> 20.5Gd/Y Ch 4K	11-5	2/14 (11L Go All The Way 11-12) 7/4	Barry Geraghty	—
21May12	<b>Ros</b> 16Gd Ch 4K	11-5	4/13 (7¼L Baily Green 11-12) 5/1	Robbie Power	—
28Apr12	<b>Pun</b> 18Hy HG3 32K	10-12	10/15 (32L Mae's Choice 11-2) t 14/1	Robbie Power	123
08Apr12	<b>Fai</b> 20Gd NvHG2 29K	11-0	2/12 (¼L Shadow Eile 11-0) 3/1	Robbie Power	118
12Feb12	<b>Leo</b> 18GS NvHG1 43K	11-3	7/7 (19½L Beneficient 11-10) 16/1	Robbie Power	118
29Jan12	<b>Leo</b> 16Sft MdH 6K	11-5	1/13 (2¾L Hawk Flight 11-12) 100/30	Robbie Power	—
13Nov11	<b>Nav</b> 16Y/Sft NvHG3 15K	10-8	3/6 (8¼L Il Fenomeno 11-1) 16/1	Robbie Power	—
26Oct11	<b>Pun</b> 16Hy NHF 5K	11-2	3/8 (14L Missunited 10-12) 5/2J	Miss K Harrington	—
05May11	<b>Pun</b> 16Gd NHF 6K	10-9	1/21 (9L Lord Gale 12-0) 13/2	Miss K Harrington	—
23Jan11	<b>Leo</b> 16Sft NHF 4K	11-0	2/8 (1¼L Mart Lane 11-7) 100/30	Miss K Harrington	—
01Jan11	<b>Fai</b> 16Sft/Hy NHF 5K	11-0	2/9 (¾L Bog Warrior 12-0) 11/2	Miss K Harrington	—
13Dec10	<b>Cor</b> 16Sft NHF 5K	10-13	3/15 (7½L What An Flyer 11-4) 7/1	Miss K Harrington	—

### Case horse nr 8 race record

- 7-y-o
- Trainer: Mrs John Harrington

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
22Jul14	<b>Bal 17Y</b> HcH 5K	11-12	9/11 (120L Wate And Sea 10-3) b <sup>1</sup> 8/1	Danny Mullins	108
04Jul14	<b>Bel 17Gd</b> HcH 6K	11-12	4/16 (16½L Portrade 11-0) 28/1	Danny Mullins	109
04Jun14	<b>Pun 16Gd/Y</b> HcH 12K	10-2	17/18 (77L Desertmore Stream 11-1) t 16/1	Danny Mullins	110
15Dec13	<b>Nav 16Y/Sft</b> HcH 8K	10-13	16/16 (95L Hop In 10-8) 13/2	Danny Mullins	110
16Nov13	<b>Pun 16Y</b> NvHcH 5K	11-7	1/13 (1L Hop In 11-6) 9/2	Danny Mullins	102
25Aug13	<b>Cor 16Gd</b> MdH 5K	11-12	10/14 (44L Curley Bill 11-12) 9/1	Danny Mullins	—
31Jul13	<b>Gal 16Sft</b> MdH 7K	11-12	7/14 (84L Blackmail 11-12) 33/1	Robbie Power	—
21Jun13	<b>Dro 16GF</b> NHF 5K	11-0	7/17 (41L Nathans Pride 11-11) 6/1	Miss K Harrington	—
07Apr13	<b>Lim 20Gd</b> NvH 7K	11-3	4/6 (23L Legal Exit 11-12) 9/1	Mark Bolger	—
10Nov12	<b>Naa 16Sft/Hy</b> 4yHG3 14K	10-13	5/8 (44L Jezki 10-13) 20/1	Robbie Power	—
03Nov12	<b>Dro 16Y/Sft</b> NHF 4K	11-4	3/18 (7¾L Gilt Shadow 11-8) 3/1	Miss K Harrington	—
24Apr12	<b>Pun 16Sft/Hy</b> 4yNHF 5K	11-2	2/23 (3¾L Grand Jesture 11-0) 16/1	Mr M Fahey	—
22Mar12	<b>Cor 16Gd/Y</b> NHF 4K	10-9	2/17 (2¼L Lughnasa 11-2) 13/8F	Miss K Harrington	—
22Feb12	<b>Pun 16Hy</b> 4yNHF 4K	11-0	3/8 (3¾L Ange Blanc 11-7) 7/2C	Miss K Harrington	—
08Jan12	<b>Naa 16Sft/Hy</b> 4yNHF 4K	11-2	5/7 (59L Un Atout 11-7) 5/1	Mr M Fahey	—

### Case horse nr 9 race record

- 5-y-o
- Trainer: D T Hughes

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
16Sep14	<b>Lis 16Gd</b> 4yHcH 24K	11-8	<b>10/11</b> (52L Orgilgo Bay 11-7) 12/1	Barry Geraghty	130
31Jul14	<b>Gal 16Gd</b> HcH 125K	9-10	<b>15/20</b> (25L Thomas Edison 10-6) 16/1	Mark Enright	131
04Jul14	<b>Bel 17Gd</b> 4yNvH 6K	11-10	<b>1/3</b> (2L The Visitor 11-0) 8/13F	Mark Enright	129
23Jun14	<b>Klb 16Gd</b> HcH 10K	11-7	<b>1/11</b> (1¾L Vinniespride 10-4) 5/1	Mark Enright	123
31May14	<b>Trm 12Gd</b> 4K	9-7	<b>5/9</b> (8¼L Waydownsouth 9-9) 7/2	Mark Enright	80
11May14	<b>Kln 17Y/Sft</b> 4yMdH 4K	11-7	<b>1/18</b> (2½L Irish Bulletin 11-7) 6/5F	Mark Enright	123
21Apr14	<b>Fai 16Gd/Y</b> 4yHG3 16K	11-0	<b>6/13</b> (5½L Ivan Grozny 11-0) 25/1	Paul Carberry	116
30Mar14	<b>Leo 10Sft/Hy</b> Hc 8K	9-0	<b>10/11</b> (19½L Bertimont 8-11) 5/1	N G McCullagh	81
01Feb14	<b>Fai 16Hy</b> MdH 5K	10-13	<b>3/20</b> (5½L Shantou Ed 11-12) 6/4F	Paul Carberry	117
18Jan14	<b>Naa 16Sft/Hy</b> 4yMdH 5K	11-7	<b>2/22</b> (12L Ivan Grozny 11-7) 9/1	Paul Carberry	117
31Dec13	<b>Pun 16Hy</b> 3yMdH 5K	11-0	<b>4/15</b> (22L Adriana Des Mottes 10-7) 3/1	Bryan Cooper	—
10Nov13	<b>Nav 16Y</b> 3yMdH 5K	11-0	<b>3/16</b> (16½L Gerdago 11-0) t EvensF	Bryan Cooper	—
24Oct13	<b>Thu 16Gd</b> 3yMdH 4K	10-12	<b>2/11</b> (2¾L Clarcam 10-13) 5/4	Bryan Cooper	—
28Aug13	<b>Kln 8.5Gd</b> Hc 5K	9-1	<b>3/10</b> (2¼L Maudlin Magdalen 8-12) 4/1	Connor King	83
31Jul13	<b>Gal 8.5Sft</b> 3yHc 9K	9-5	<b>2/4</b> (1L Lucky Kitten 9-2) 6/4	F M Berry	83
04Jul13	<b>Leo 10GF</b> 3yHc 7K	9-8	<b>3/8</b> (2½L Teoirim 9-3) 13/2	F M Berry	83
10Jun13	<b>Ros 7GF</b> 5K	9-5	<b>1/9</b> (¾L Lean And Keen 8-9) 4/1	F M Berry	—
15May13	<b>Naa 10Y/Sft</b> 5K	9-2	<b>4/9</b> (3¾L Resolute Response 9-5) 20/1	Mark Enright	—

### Case horse nr 10 race record

- 6-y-o
- Trainer: D T Hughes

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
30Jul14	<b>Gal 16Gd</b> MdH 7K	11-12	8/13 (25L Most Peculiar 11-12) 25/1	Mark Enright	—
18Jul14	<b>Klb 16Gd</b> MdH 4K	11-5	3/8 (6¾L Damefirth 10-8) v 6/1	Gary Noonan	—
06Jul14	<b>Bel 17GF</b> MdH 4K	11-12	3/9 (17L The Parishioner 11-4) 11/2	Mark Enright	—
23Jun14	<b>Klb 16Gd</b> MdH 5K	11-12	3/14 (4¼L Brian's Express 11-4) 9/2	Mark Enright	—
10Jun14	<b>Ros 16Gd</b> MdH 4K	11-12	4/18 (11½L Ballychorus 11-5) 14/1	Mark Enright	—
31May14	<b>Trm 12Gd</b> Hc 4K	9-9	9/13 (16L Secret Seven 9-13) v <sup>1</sup> 7/1	Mark Enright	63
15May14	<b>Tip 16Y</b> MdH 4K	11-12	2/20 (3½L Cillian's Return 11-12) 16/1	Mark Enright	—
19Apr14	<b>Cor 8.5Gd/Y</b> Hc 4K	9-6	9/16 (7L Fiosrach 9-6) 12/1	Sean Corby	66
02Apr14	<b>Leo 8Hy</b> Hc 4K	9-7	15/16 (27L Conan's Rock 8-12) 16/1	N G McCullagh	67
20Nov13	<b>Kem 10St</b> C5Hc 2K	9-4	10/14 (5¼L Maria's Choice 9-8) 25/1	Luke Morris	70
23Oct13	<b>Kem 8St</b> C5Hc 2K	9-4	8/14 (9¼L Cape Samba 9-3) 20/1	Pat Dobbs	72
16Oct13	<b>Lin 8St</b> C5Hc 2K	9-5	5/12 (5½L The Great Gabriel 8-13) 10/1	Ted Durcan	73
09Oct13	<b>Not 8.5Gd</b> C5Hc 2K	9-2	11/16 (10L Amulet 8-12) 20/1	James Doyle	68
16Sep13	<b>Bri 8GS</b> C6Hc 1K	9-9	2/9 (1L Bloodsweatandtears 9-2) 7/1	Andrea Atzeni	64
16Aug13	<b>Nby 9Gd</b> C5Hc 2K	9-6	8/10 (13½L Hector's Chance 9-3) 16/1	Josh Baudains	67
29Jul13	<b>Wdr 10GF</b> C5Hc 2K	9-10	5/7 (7¼L Breaking The Bank 9-10) 20/1	Liam Keniry	70
27Jul13	<b>Sal 8GF</b> C5Hc 2K	11-2	8/8 (75L Harbour Captain 10-6) 11/1	Mr J Reddington	70
08Jul13	<b>Wdr 8.5GF</b> C4Hc 4K	9-5	5/8 (6¾L Consign 8-13) 33/1	Liam Keniry	73
26Jun13	<b>Kem 8St</b> C4Hc 4K	9-7	10/10 (12L Sennockian Star 8-10) 16/1	James Doyle	77
06Jun13	<b>San 8GF</b> C4Hc 4K	8-13	12/14 (16L Roserrow 9-7) 20/1	Richard Hughes	77
22May13	<b>Lin 8St</b> C5Hc 2K	9-6	2/8 (¾L Emmuska 9-7) 3/1	George Baker	74
06May13	<b>Wdr 10GF</b> C4Hc 4K	8-11	6/7 (12½L Come On Blue Chip 9-1) 6/1	James Doyle	75
25Apr13	<b>Lin 8St</b> C5Hc 2K	9-7	1/10 (nse Rezwaan 9-10) 11/4F	Ryan Moore	70
12Apr13	<b>Lin 8St</b> C5Hc 2K	9-7	2/11 (½L Kingswinford 9-3) 4/1	Ryan Moore	70
27Dec12	<b>Lin 10St</b> C5Hc 2K	9-1	7/8 (11L Saoi 9-7) b 4/1	Kieran O'Neill	72
21Nov12	<b>Kem 10St</b> C5Hc 2K	9-0	7/13 (8½L Ancient Greece 9-9) b 8/1	William Twiston-Davies	74
08Nov12	<b>Lin 10St/Slw</b> C53yHc 2K	9-2	8/12 (3¼L Sheila's Buddy 9-6) 8/1	William Twiston-Davies	75
26Oct12	<b>Nby 8Hy</b> C53yHc 2K	9-2	3/9 (1¾L Anya 9-5) 8/1	William Twiston-Davies	75
17Oct12	<b>Lin 8St/Slw</b> C5Hc 2K	9-4	3/11 (2¾L Schoolmaster 9-6) 6/1	Richard Hughes	75
14Sep12	<b>San 10GF</b> C4Hc 4K	9-1	8/14 (6½L Looking On 9-6) 6/1	Pat Dobbs	76
01Sep12	<b>San 10GF</b> C4Hc 5K	8-12	2/14 (1¼L Quixote 8-9) 16/1	John Fahy	73
26Aug12	<b>Goo 7GS</b> C4Hc 4K	9-0	7/7 (7½L Bravo Echo 9-7) b 9/4F	Richard Hughes	73
26Jul12	<b>San 7GF</b> C5Hc 2K	9-7	5/12 (3¾L Annes Rocket 8-8) b <sup>1</sup> 9/2J	Pat Dobbs	75
25Jun12	<b>Wdr 8.5Gd</b> C43yHc 4K	9-4	6/10 (9¼L Ocean Tempest 9-4) 9/1	Richard Hughes	79

<u>08Jun12</u>	<b>Nmk 10Sft</b> C33yHc 7K	8-12	<b>9/9</b> (43L Thomas Chippendale 9-0) 20/1	<u>Ryan Moore</u>	84
<u>19May12</u>	<b>Nby 10GS</b> C23yHc 15K	9-5	<b>11/13</b> (27L Expense Claim 9-3) 14/1	<u>Richard Hughes</u>	87
<u>19Oct11</u>	<b>Nmk 9Gd</b> C42yHc 3K	9-11	<b>4/12</b> (5L Main Sequence 9-6) 9/2	<u>Ryan Moore</u>	84
<u>09Oct11</u>	<b>Goo 7Gd</b> C42yHc 4K	9-5	<b>1/10</b> (2L Dixie's Dream 9-2) 11/4F	<u>Richard Hughes</u>	78
<u>06Sep11</u>	<b>Lin 7GS</b> C52yHc 2K	9-4	<b>1/11</b> (¾L Long Lost Love 9-0) 7/2F	<u>Dane O'Neill</u>	72
<u>04Aug11</u>	<b>San 8GS</b> C52yMd 3K	9-3	<b>7/9</b> (8L Martin Chuzzlewit 9-3) 14/1	<u>Richard Hughes</u>	—
<u>30Jun11</u>	<b>Eps 7GF</b> C52yMd 3K	9-3	<b>3/6</b> (4L Captain Cardington 9-3) 5/2	<u>Jimmy Fortune</u>	—
<u>10Jun11</u>	<b>San 7Gd</b> C52yMd 3K	9-3	<b>6/10</b> (8½L John Lightbody 9-3) 6/1	<u>Richard Hughes</u>	—

### Case horse nr 11 race record

- 10-y-o
- Trainer: N W Alexander

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
03Jan15	<b>Ncs 22Sft</b> C4HcH 3K	11-5	12/15 (66L Milan Flyer 10-9) t 16/1	Stephen Mulqueen	105
10Dec14	<b>Hex 23Hy</b> C4HcCh 4K	11-12	PU/5 (Sharney Sike 11-0) p 8/1	Lucy Alexander	120
27Oct14	<b>Ayr 25GS</b> C3HcCh 7K	11-0	5/8 (18L Always Right 11-2) p 40/1	Stephen Mulqueen	125
11Jan14	<b>Pun 24Sft/Hy</b> HcH 8K	9-10	7/11 (24L Annie Oakley 10-4) 8/1	Gary Noonan	109
28Dec13	<b>Leo 24Sft</b> HcH 12K	9-3	6/21 (19L Courage 10-1) 25/1	Gary Noonan	113
30Nov13	<b>Fai 20Gd/Y</b> HcH 5K	11-8	9/24 (9L Followmeuptocarlow 11-11) 25/1	Bryan Cooper	111
10Nov13	<b>Nav 16Y</b> HcH 5K	11-10	15/18 (24L Spacious Sky 10-2) 16/1	Bryan Cooper	114
01Apr13	<b>Fai 22.5Y/Sft</b> NvHcCh 8K	11-5	PU/12 (Solstice Knight 10-12) b 25/1	Mr J J King	123
02Mar13	<b>Nav 20Sft</b> HcH 5K	11-7	14/19 (56L Rockyaboya 11-7) 16/1	Mark Enright	116
28Dec12	<b>Leo 16Sft</b> H 9K	11-2	13/16 (29L Supreme Carolina 10-13) 16/1	Bryan Cooper	117
16Dec12	<b>Nav 20Hy</b> HcCh 8K	11-12	PU/15 (Sole Witness 11-6) 11/2	Bryan Cooper	125
17Nov12	<b>Pun 20Hy</b> Ch 6K	11-12	1/12 (2¾L Mikael D'Haguenet 11-12) 11/1	Bryan Cooper	—
02Nov12	<b>Dro 20Y/Sft</b> Ch 7K	11-12	2/11 (4¾L Beneficient 11-12) 5/1	Bryan Cooper	—
13Oct12	<b>Fai 16Sft/Hy</b> HcH 5K	11-10	3/16 (1¼L Acriveen 10-7) 13/2	Bryan Cooper	114
11Aug12	<b>Klb 20Gd</b> Ch 4K	11-12	11/13 (34L Cloone Rocket 11-12) 2/1F	Bryan Cooper	—
06Aug12	<b>Naa 19Y/Sft</b> H 5K	11-2	2/9 (8½L Beau Michael 10-13) 8/1	Bryan Cooper	114
22Jun12	<b>Dro 20Sft</b> Ch 4K	11-12	3/11 (6¾L Pride Of The Artic 11-12) b <sup>1</sup> 11/4J	Bryan Cooper	—
07Jun12	<b>Tip 20Sft</b> Ch 4K	11-12	3/12 (5½L Catcherinscratcher 11-5) p 8/1	Bryan Cooper	—
07May12	<b>Dro 20GF</b> Ch 4K	11-12	2/13 (1¾L Devil's Elbow 11-5) 7/1	Bryan Cooper	—
25Apr12	<b>Pun 20Hy</b> HcH 14K	11-2	8/25 (46L Shamiran 11-4) p 33/1	Mark Enright	116
08Apr12	<b>Fai 22.5Gd</b> Ch 7K	11-12	PU/16 (Heavenly Brook 11-12) 4/1F	Bryan Cooper	—
17Mar12	<b>Dro 20Sft</b> Ch 4K	11-12	F/8 (Dantes King 11-12) 2/1F	Bryan Cooper	—
03Mar12	<b>Nav 20Sft</b> Ch 6K	11-12	2/7 (4¾L Cadogan 11-12) 16/1	Bryan Cooper	—
05Mar11	<b>Gow 20Sft/Hy</b> Ch 7K	11-12	UR/18 (Uncle Junior 11-12) 2/1F	P W Flood	—
19Feb11	<b>Gow 18Hy</b> Ch 7K	11-12	4/18 (8½L Tawaagg 11-12) 16/1	P W Flood	—
02Feb11	<b>Dro 20Y/Sft</b> Ch 4K	11-12	PU/18 (Dundrum 11-12) 7/1	P W Flood	—
02Nov08	<b>Leo 16Sft</b> Hc 23K	8-4	11/19 (20L Solwhit 8-8) 10/1	Chris Hayes	86
16Sep08	<b>Lis 16Hy</b> 3yH 9K	11-4	1/18 (2L Hampstead Heath 11-4) 4/7F	Paul Carberry	—
31Aug08	<b>Kln 17Gd/Y</b> 3yMdH 4K	10-12	1/18 (7L Gudnis Gracious Me 10-7) 4/5F	Barry Geraghty	—
09Feb08	<b>Cag 11VSft</b> 3y 13K	8-9	2/4 (3L Wise Man 8-9) 2/1F	M Blancpain	—
24Jan08	<b>Cag 10St</b> 6K	9-2	1/3 (½L Titan War 9-2) 33/10	M Blancpain	—
14Jan08	<b>Cag 10St</b> 3y 6K	9-2	3/3 (3½L Song Of Tiger 9-2) 5/1	M Blancpain	—
24Nov07	<b>Sai 7Hy</b> 2y 7K	9-2	6/10 (5½L Bermuda Rye 9-2) 33/1	M Blancpain	—



### Case horse nr 12 race record

- 7-y-o
- Trainer: Mrs John Harrington

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
27Dec14	<b>Leo 16Hy</b> HcH 14K	11-2	2/13 (1¼L Shantou Ed 10-4) t 4/1F	Robbie Power	133
07Dec14	<b>Pun 16Gd/Y</b> NvH 8K	11-7	1/7 (7L A Sizing Network 11-1) t 8/11F	Robbie Power	123
23Nov14	<b>Nav 20Sft</b> NvHG2 20K	11-3	3/7 (6¾L Free Expression 11-3) t 15/2	Barry Geraghty	123
01Nov14	<b>Dro 16Y</b> MdH 8K	11-4	1/16 (4¾L Velvet Maker 11-12) 11/4	Robbie Power	—
02May14	<b>Pun 16Gd/Y</b> NvH 12K	11-5	5/13 (14½L Arctic Fire 11-12) t 7/1	Barry Geraghty	—
20Apr14	<b>Fai 16Gd/Y</b> MdH 6K	11-12	4/25 (15L Emperor Of Exmoor 11-12) 11/8F	Barry Geraghty	—
26Jan14	<b>Leo 16Sft/Hy</b> MdH 5K	11-12	6/16 (21L Quickpick Vic 11-12) 5/2F	Barry Geraghty	—
15Dec13	<b>Nav 16Y</b> MdH 7K	11-12	2/30 (3¾L Sizing Tennessee 11-12) 3/1	Barry Geraghty	—
02Nov13	<b>Dro 16Y/Sft</b> MdH 7K	11-4	2/15 (8½L Gilt Shadow 11-9) 5/2F	Robbie Power	—
04Oct13	<b>Gow 16Sft</b> MdH 5K	11-12	2/20 (1¾L Bishops Road 11-12) 7/2	Barry Geraghty	—
11May13	<b>Pun 16Y</b> NHF 4K	11-7	5/22 (27L Faugheen 12-0) 9/4	Miss K Harrington	—
27Apr13	<b>Pun 16Hy</b> NHF 5K	11-7	2/14 (2L Martello Tower 12-0) 9/2	Miss K Harrington	—

### Case horse nr 13 race record

- 4-y-o
- Trainer: Mrs John Harrington

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
26Dec14	<b>Leo 16Sft</b> 3yHG2 21K	10-5	<b>8/12</b> (36L Fiscal Focus 10-12) t 16/1	Paul Carberry	—
30Nov14	<b>Fai 16Y</b> 3yHG3 16K	10-2	<b>8/15</b> (31L Kalkir 10-9) t 100/30	D J Casey	—
09Nov14	<b>Nav 16Y/Sft</b> 3yMdH 5K	10-7	<b>1/14</b> (5½L Prussian Eagle 11-0) t 9/2	Robbie Power	—
18Sep14	<b>Lis 14Gd</b> Hc 9K	8-9	<b>2/8</b> (¼L Face Value 8-4) tp 10/1	Shane Foley	80
28Jul14	<b>Gal 12Gd</b> 3yHc 8K	9-6	<b>6/8</b> (14½L Timiyan 9-4) 14/1	Conor Hoban	82
27Jun14	<b>Cur 12GF</b> 11K	8-11	<b>7/9</b> (19½L News At Six 9-9) p 13/2	Conor Hoban	82
20Jun14	<b>Lim 11.5Gd</b> 6K	8-11	<b>1/6</b> (hd Red Raven 9-0) 11/4	Conor Hoban	76
08Jun14	<b>Cur 12Y</b> 3yHc 8K	8-1	<b>2/9</b> (hd Urban Moon 9-7) 11/4F	Conor Hoban	68
19May14	<b>Ros 10Sft/Hy</b> 3yHc 4K	9-4	<b>2/10</b> (¾L Abby Cadabby 9-11) 7/2	F M Berry	62
04May14	<b>Sli 10Y/Sft</b> 3yHc 6K	8-3	<b>2/8</b> (2½L Daredevil Day 8-10) 10/1	Conor Hoban	60
04Oct13	<b>Dun 8St</b> 2y 8K	9-0	<b>7/9</b> (12L Aussie Valentine 8-13) 12/1	N G McCullagh	—
29Aug13	<b>Kln 8.5Gd</b> 2y 7K	9-0	<b>6/11</b> (16½L Adelana 9-0) 8/1	F M Berry	—
09Aug13	<b>Tip 7.5Gd</b> 2y 8K	9-0	<b>5/11</b> (11L Ballybacka Queen 9-0) 20/1	F M Berry	—

### Case horse nr 14 race record

- 9-y-o
- Trainer: T J Nagle Jr

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
06Jul14	<b>Lim 22GF</b> HcCh 8K	10-12	<b>4/11</b> (11L On The Way Out 11-1) p 7/1	Michael Darcy	111
23Jun14	<b>Klb 20Gd</b> HcCh 7K	11-8	<b>3/9</b> (11½L Fever Pitch 11-8) p 13/8F	Barry Geraghty	111
01Jun14	<b>Klb 25Gd</b> HcCh 8K	10-13	<b>2/11</b> (2L Rivage D'Or 11-5) 7/1	A E Lynch	109
03May14	<b>Pun 30Gd/Y</b> HcCh 16K	9-10	<b>12/19</b> (57L Unoccupied 9-12) 20/1	A E Lynch	113
25Apr14	<b>Klb 25Gd</b> HcCh 6K	11-12	<b>2/8</b> (7½L Aces And Kings 11-5) 10/1	Mark Bolger	109
11Apr14	<b>Wex 25Y/Sft</b> HcCh 5K	11-10	<b>4/9</b> (38L Lord Alfie 10-6) 14/1	Mark Bolger	112
11Jan14	<b>Pun 25Sft/Hy</b> HcCh 9K	11-11	<b>PU/19</b> (Too Late To Sell 10-1) 14/1	Mr K E Power	114
29Dec13	<b>Leo 21Y/Sft</b> HcCh 7K	11-7	<b>F/18</b> (Wrong Turn 11-0) 14/1	Ryan Treacy	114
08Dec13	<b>Pun 22Gd/Y</b> HcCh 12K	10-1	<b>3/16</b> (13L Daring Article 10-3) 16/1	Mark Bolger	114
03Nov13	<b>Cor 28Sft</b> HcCh 26K	10-2	<b>PU/17</b> (Sword Fish 9-7) 14/1	Eddie O'Connell	115
03Jun13	<b>Lis 19Gd</b> HcCh 12K	10-3	<b>PU/18</b> (Mr Cracker 11-5) t 10/1	A P Heskin	116
17May13	<b>Klb 25Y/Sft</b> HcCh 8K	11-9	<b>3/12</b> (15½L Wise Oscar 11-8) t 12/1	Brian O'Connell	116
03Apr13	<b>Dpt 28Gd</b> HcCh 13K	10-11	<b>7/15</b> (83L Pineau De Re 11-7) 9/1	Stephen Gray	118
07Mar13	<b>Clo 20Sft</b> HcCh 9K	11-7	<b>3/14</b> (7¾L Hidden Crack 10-12) t 10/1	Stephen Gray	118
02Mar13	<b>Nav 24Sft</b> HcCh 8K	11-11	<b>PU/14</b> (Wise Oscar 10-8) 10/1	Tom Doyle	118
25Nov12	<b>Nav 24Hy</b> HcCh 43K	10-2	<b>PU/20</b> (Tofino Bay 11-4) 11/1	Tom Doyle	118
04Nov12	<b>Cor 28Sft</b> HcCh 27K	10-3	<b>4/17</b> (25L Raz De Maree 11-3) 15/2	A P Heskin	118
29Oct12	<b>Gal 22Hy</b> HcCh 12K	10-0	<b>2/8</b> (4L Selection Box 10-1) 10/1	Tom Doyle	116
15May12	<b>Kln 22Gd</b> NvCh 6K	11-10	<b>10/11</b> (86L Carlito Brigante 11-4) t 20/1	Tom Doyle	118
26Apr12	<b>Pun 20Hy</b> H 12K	11-6	<b>PU/11</b> (Tofino Bay 11-12) 20/1	Tom Doyle	—
18Mar12	<b>Nav 23Sft</b> NvH 9K	11-0	<b>5/7</b> (30L My Murphy 11-7) 14/1	Tom Doyle	—
25Feb12	<b>Fai 22.5Sft</b> HntCh 4K	11-4	<b>1/10</b> (4½L Agus A Vic 11-1) 5/1	Mr K E Power	—
02Feb12	<b>Clo 20Hy</b> MdHntCh 4K	11-7	<b>2/14</b> (2L Boxer Georg 12-0) 25/1	Richie O'Dea	—
22Jan12	<b>Dng 24Y</b> MdPTP	12-0	<b>1/13</b> (3L Ring Ben 11-9) 5/2J	K E Power	—
13Nov11	<b>Drh 24Y</b> MdPTP	11-9	<b>3/12</b> (18L Sraid Padraig 12-0) 5/2	R M O'Dea	—
23Oct11	<b>Drh 24Sft</b> MdPTP	11-9	<b>2/11</b> (1½L Betterthanaright 12-0) 3/1	R M O'Dea	—
06Mar11	<b>Klw 24Y</b> PTP	12-0	<b>3/15</b> (2L Highland Lodge 12-0) 10/1	K F C O'Brien	—
13Feb11	<b>Kno 24Sft</b> PTP	12-0	<b>9/17</b> (31L Kandinski 12-0) 10/1	E P O'Brien	—
01Feb11	<b>Dng 24Y</b> PTP	12-0	<b>5/14</b> (16½L Ruben Cotter 12-0) 8/1	J C Barry	—

### Case horse nr 15 race record

- 9-y-o
- Trainer: Mrs D A Love

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
16Oct13	<b>Pun 16Gd</b> HcH 4K	11-7	18/19 (91L King Of Oriel 11-2) 25/1	Mark Walsh	96
11Oct13	<b>Dun 12St</b> Hc 5K	9-2	14/14 (44L Ancient Sands 9-6) ev <sup>1</sup> 33/1	Wayne Lordan	72
24Sep13	<b>Bal 16Gd</b> HcH 5K	11-0	PU/16 (Ancient Sands 11-10) 11/1	Davy Russell	97
19Jul13	<b>Klb 24GF</b> HcH 4K	11-12	PU/16 (Ocean Bright 11-9) eb <sup>1</sup> 16/1	Mark Walsh	102
11Jul13	<b>Leo 12GF</b> Hc 4K	9-11	4/5 (4¼L Fosters Cross 10-0) h <sup>1</sup> 12/1	Pat Smullen	72
24Jun13	<b>Klb 20GF</b> HcH 8K	10-3	11/12 (79L Gudnis Gracious Me 10-8) p 25/1	Ben Dalton	106
06Jun13	<b>Tip 16GF</b> HcH 8K	10-9	15/19 (23L Ted Dolly 11-3) 25/1	Ben Dalton	109
06Oct12	<b>Gow 18Gd</b> Ch 6K	11-12	9/18 (60L Protaras 11-11) t 25/1	Bryan Cooper	—
13Sep12	<b>Lay 7St</b> Hc 5K	11-13	9/10 (12L Six Silver Lane 12-3) 20/1	Mr J T Carroll	77
23Aug12	<b>Bel 20Y</b> HcH 8K	10-8	11/12 (66L Caim Hill 10-13) 16/1	Bryan Cooper	114
30Jul12	<b>Gal 16Gd</b> HcH 8K	11-4	PU/20 (Kalellshan 11-5) 20/1	Phillip Enright	115
19Jul12	<b>Kln 17Gd/Y</b> HcH 8K	11-3	7/15 (15L Keep It Cool 10-0) 12/1	Bryan Cooper	116
04May11	<b>Pun 20Gd</b> HcH 15K	11-8	4/25 (24L Oneeightofamile 11-8) 12/1	Danny Mullins	119
25Apr11	<b>Fai 16Gd</b> NvHG2 22K	11-4	6/7 (29L Prima Vista 11-4) 12/1	D J Casey	—
31Oct10	<b>Leo 16Sft</b> Hc 21K	8-13	7/21 (12L What A Charm 9-2) 20/1	Declan McDonogh	85
20Oct10	<b>Nay 13Gd</b> Hc 8K	9-2	5/18 (8L Table Mountain 9-2) 16/1	Edmond Linehan	85
18Sep10	<b>Lis 16Gd</b> 4yMdH 7K	11-7	1/18 (2½L Gallilei 11-7) 7/4F	R Walsh	—
30Aug10	<b>Eps 12Gd</b> C4Hc 6K	11-7	7/15 (5L Maybe I Wont 9-13) 6/1	Mr P W Mullins	85
18Aug10	<b>Kln 14GF</b> Hc 21K	8-13	6/14 (5L Top Spin 7-11) 12/1	Pat Smullen	87
30Jul10	<b>Gal 12GF</b> Hc 37K	8-10	18/18 (25L Rajik 8-11) 9/1	Gary Carroll	87
02Jun10	<b>Fai 12GF</b> Hc 6K	8-12	1/18 (2L Articulitis 8-7) 16/1	Edmond Linehan	74
18Oct09	<b>Sth 11St</b> C4Hc 5K	8-7	7/9 (24L Eseej 8-9) 10/1	Ted Durcan	76
25Sep09	<b>Asc 8Gd</b> C43yHc 7K	8-13	15/17 (21L Glowing Praise 8-13) 4/1F	Kieren Fallon	78
24Aug09	<b>Wdr 10GF</b> C5Md 2K	9-3	3/10 (1½L Zemario 9-3) 1/2F	Richard Hughes	79
03Aug09	<b>Wdr 10GF</b> C5Md 2K	9-3	2/12 (2½L Assabiyya 8-12) 9/4	Dane O'Neill	—
07Jul09	<b>Pon 10GS</b> C5Md 3K	9-1	4/8 (9½L Dove 9-7) 6/5F	Jamie Spencer	—
13Jun09	<b>San 10Gd</b> C53yMd 3K	9-3	4/15 (1¼L Brooklyn Spirit 9-3) 7/1	Tom Queally	—

### Case horse nr 16 race record

- 8-y-o
- Trainer: A J Martin

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
31Jul14	<b>Gal</b> 16Gd HcH 125K	10-6	1/20 (3L Bayan 10-12) ht 7/2F	A P McCoy	135
25May14	<b>Cur</b> 12Sft Hc 25K	8-13	1/13 (1¼L Toe The Line 8-6) ht 4/1F	F M Berry	83
03May14	<b>Pun</b> 20Gd/Y HcH 50K	10-9	5/25 (11½L Deep Trouble 10-9) t 20/1	Mark Walsh	135
13Apr14	<b>Cur</b> 12Y Hc 8K	8-12	1/12 (nse Little Rocky 10-0) t 7/2	F M Berry	76
14Mar14	<b>Chl</b> 17Gd C1HcHG3 45K	10- 10	13/28 (15L Lac Fontana 10-11) ht <sup>1</sup> 20/1	Mark Walsh	138
17Nov13	<b>Chl</b> 16.5Gd C1HcHG3 56K	11-1	BD/18 (Dell' Arca 10-5) t 10/1	A P McCoy	138
02Nov13	<b>Dro</b> 16Y/Sft HcH 21K	11-4	3/9 (3¼L Time To Work 10-11) t 4/1	Mark Walsh	132
09Oct13	<b>Nav</b> 16Y 4K	10-2	7/17 (29L Sardinia 9-5) t 8/1	Niall P Madden	—
20Aug13	<b>Sli</b> 10Sft 4K	9-13	2/14 (8L Long Dog 9-5) t EvensF	F M Berry	—
01Aug13	<b>Gal</b> 16Hy HcH 127K	10-6	11/20 (31L Missunited 10-8) t 8/1	A P McCoy	133
06Jul13	<b>Bel</b> 12GF 4K	10-4	2/13 (11L Cardinal Palace 8-12) t 7/2	F M Berry	—
26Jan13	<b>Leo</b> 16Hy HcH 48K	11-1	BD/28 (Abbey Lane 10-8) t 25/1	Mark Walsh	132
22Dec12	<b>Asc</b> 16Hy C1HcHL 84K	10-6	10/21 (33L Cause Of Causes 10-13) t 33/1	Mark Walsh	135
03Nov12	<b>Dro</b> 16Y/Sft HcH 21K	10-9	2/13 (4L Beef To The Heels 9-3) t 7/1	Mark Walsh	127
20Sep12	<b>Lis</b> 16Hy HcH 21K	11-3	7/10 (16L Lough Ferrib 10-12) t 12/1	Mark Walsh	128
01Sep12	<b>Kln</b> 17Y/Sft HcH 15K	11-2	PU/15 (Baily Green 10-9) t 12/1	Mark Walsh	128
19Jul12	<b>Kln</b> 17Gd/Y NvH 6K	11- 12	2/8 (3¼L Run With The Wind 11-9) t 11/10F	Mark Walsh	—
07Jul12	<b>Bel</b> 17Sft MdH 4K	11- 12	1/14 (9½L Hawkins Street 11-1) t 1/3F	Mark Walsh	—
24Jun12	<b>Gow</b> 18Sft MdH 5K	11- 12	F/19 (Maxim Gorky 11-12) t 6/4F	Mark Walsh	—
26Dec11	<b>Leo</b> 16Y/Sft 4yNHF 10K	11-9	1/13 (4¼L Champagne Fever 11-9) t 12/1	Mr K E Power	—
04Dec11	<b>Fai</b> 16Sft/Hy 4yNHF 5K	11-2	3/14 (6L Venture Capital 11-4) t 10/1	Mr S J Craig	—
05Nov11	<b>Dro</b> 16Sft MdH 8K	10- 11	3/13 (4¼L Benny's Fagartha 10-9) t 12/1	Mr S J Craig	—

### Annex 3: Race data of the “control” racehorses

Selected race for the study

-The races selected for the control horses are aligned timewise with the treated horses from the third race before surgery.

#### Control horse nr 1 race record

- 7-y-o
- Trainer: Tony Coyle

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
26Dec14	<b>Wet 25GS</b> C4NvHcCh 3K	11-7	<u>2/7 (22L Itstimeforapint 10-12) b</u> 11/2	Dougie Costello	100
02Dec14	<b>Sed 27Sft</b> C4NvHcCh 4K	11-12	<u>3/4 (88L Generous Chief 11-5) b</u> 3/1	Dougie Costello	100
19Nov14	<b>Hex 32Hy</b> C4HcCh 4K	10-6	<u>2/5 (1L Snuker 10-4) b 5/2F</u>	Dougie Costello	96
15Nov14	<b>Wet 25Sft</b> C4HcH 3K	10-9	<u>1/10 (7L Solway Sam 10-6) b<sup>1</sup> 9/2J</u>	Dougie Costello	99
07Nov14	<b>Hex 24Sft</b> C5HcH 2K	11-12	<u>3/12 (15L Madam Lilibet 10-11) p</u> 20/1	Jake Greenall	100
11Oct14	<b>Hex 20.5GS</b> C4NvHcCh 4K	11-7	<u>5/9 (36L Cobajayisland 11-12) p</u> 11/2	Dougie Costello	100
05Oct14	<b>Kel 23.5Sft</b> C4NvHcCh 6K	11-9	<u>F/6 (Big Sound 11-12) p 11/2</u>	Danny Cook	100
16Apr14	<b>Sth 20.5Gd</b> C4NvHcH 3K	11-10	<u>5/13 (31L Catching On 11-6) p 7/1</u>	Dougie Costello	103
15Mar14	<b>Utt 20.5GS</b> C5NvHcH 3K	11-9	<u>1/13 (nk Icanmotor 10-6) p 9/2</u>	Dougie Costello	95
24Feb14	<b>Mus 24.5Sft</b> C5HcH 3K	11-9	<u>9/11 (26L Ryton Runner 11-5) 5/1</u>	Dougie Costello	97
17Feb14	<b>Sth 18St</b> C4NHF 3K	11-2	<u>4/9 (7L Mitchell's Way 11-2) 6/1</u>	Dougie Costello	—
26Dec13	<b>Mar 21Sft</b> C5NvHcH 2K	11-11	<u>PU/11 (Crookstown 11-9) 5/2F</u>	Tom Messenger	97
01Nov13	<b>Wet 22GS</b> C4NvHcH 3K	11-0	<u>3/10 (8½L Cyrien Star 11-5) 11/4F</u>	Jack Quinlan	92
17Oct13	<b>Utt 20.5GS</b> C5HcH 2K	10-11	<u>1/14 (1½L Texas Rose 11-7) 11/4F</u>	Dougie Costello	85
12Oct13	<b>Hex 24Gd</b> C5HcH 2K	10-11	<u>2/10 (1¾L Hartforth 10-4) 5/2F</u>	Dougie Costello	85
31Aug13	<b>Mar 21Gd</b> C4NvH 3K	10-12	<u>4/4 (21L Wake Your Dreams 11-12)</u> 25/1	Noel Fehily	—
01Apr13	<b>Ncs 20GS</b> C4NvH 3K	10-11	<u>6/12 (36L Victor Hewgo 11-12) 66/1</u>	Brian Toomey	—
27Mar13	<b>Wet 16.5Sft</b> C5MdH 1K	10-11	<u>10/12 (48L Discovery Bay 11-0)</u> 100/1	Brian Toomey	—
02Feb13	<b>Wet 16.5Sft</b> C6NHF 1K	11-1	<u>7/8 (32L Dakar Run 10-8) 33/1</u>	Brian Toomey	—
16Dec12	<b>CrI 17Hy</b> C6NHF 1K	10-11	<u>4/9 (15L Standintheband 10-11)</u> 20/1	Brian Toomey	—

## Control horse nr 2 race record

- 7-y-o
- Trainer: Keith Dalglish

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
02Feb15	<b>Wol 8.5St</b> C2 11K	9-3	3/5 (1½L Graphic 9-8) p 7/4F	Phillip Makin	10 9
23Jan15	<b>Lin 7St</b> C2Hc 28K	9-10	5/13 (2¼L Shyron 8-3) p 20/1	Phillip Makin	10 9
18Apr14	<b>Lin 8St</b> C2 93K	9-5	8/12 (5¼L Captain Cat 9-5) p 6/1	Tom Eaves	11 1
29Mar14	<b>Don 8Sft</b> C2Hc 62K	9-13	17/17 (47L Ocean Tempest 9-3) p 22/1	Tom Eaves	11 2
08Mar14	<b>Wol 7St</b> C1L 28K	9-3	1/10 (3¼L Hasopop 9-3) p 4/1F	Tom Eaves	10 7
22Feb14	<b>Lin 10St</b> C1L 25K	9-0	8/10 (8¼L Grandeur 9-3) p 8/1	Tom Eaves	10 7
03Feb14	<b>Wol 8.5St</b> C2 11K	9-0	1/5 (7L Star Links 9-0) p 7/4F	Tom Eaves	99
11Jan14	<b>Lin 8St</b> C2 12K	9-0	2/6 (hd Grey Mirage 9-0) p 12/1	Tom Eaves	98
07Nov13	<b>Wol 9.5St</b> C2Hc 11K	8-12	2/7 (7L Prince Alzain 9-5) p 2/1	Jason Hart	94
06Nov13	<b>Kem 7St</b> C3Hc 7K	9-4	2/10 (¼L Common Touch 9-3) p 3/1	Jason Hart	94
31Oct13	<b>Kem 8St</b> C3Hc 7K	9-1	2/14 (1¼L Captain Cat 8-12) p 6/1	Jason Hart	92
23Oct13	<b>Kem 7St</b> C4Hc 4K	9-8	1/13 (nk Head Of Steam 9-5) p 9/1	Jason Hart	91
14Oct13	<b>Mus 7GF</b> C3Hc 7K	8-8	1/12 (2¾L Silver Rime 8-13) p 9/1	Jason Hart	80
21Sep13	<b>Ayr 7GS</b> C3Hc 9K	8-10	9/13 (6¼L Silver Rime 8-6) p 16/1	Tom Eaves	82
19Sep13	<b>Ayr 8Sft</b> C4Hc 6K	9-7	12/14 (16½L Dream Walker 8-11) p 22/1	Tom Eaves	82
05Aug13	<b>Crl 8GS</b> C4Hc 6K	10-7	2/12 (5L Hot Rod Mamma 9-11) p 10/1	Laura Barry	82
15Jul13	<b>Ayr 8GF</b> C2Hc 12K	9-5	7/8 (7L Sennockian Star 8-11) p 12/1	Graham Lee	84
06Jul13	<b>Crl 8GF</b> C4Hc 6K	10-0	8/12 (5½L Sennockian Star 9-3) p 9/1	Sean Levey	84
26Jun13	<b>Crl 8Gd</b> C4Hc 18K	9-3	2/15 (hd Silvery Moon 9-7) p 33/1	Tom Eaves	81
22Jun13	<b>Red 7GF</b> C3Hc 7K	8-7	6/8 (6¾L Wannabe King 8-13) b 3/1	Jason Hart	81
15Jun13	<b>Mus 7GF</b> C2Hc 12K	8-2	3/10 (3L Clockmaker 8-8) b 14/1	James Sullivan	81
01Jun13	<b>Mus 7GF</b> C4Hc 6K	9-5	4/11 (2¾L Powerful Presence 9-6) b 5/1	Joe Fanning	82
21May13	<b>Ncs 7Sft</b> C3Hc 7K	9-2	5/9 (6L Amazing Amoray 8-12) b <sup>1</sup> 22/1	Tom Eaves	85
10May13	<b>Rip 10Gd</b> C3Hc 7K	9-5	8/9 (14½L Awake My Soul 9-1) p 10/1	Barry McHugh	86
20Apr13	<b>Nby 8GS</b> C2Hc 28K	8-4	13/25 (14L Haaf A Sixpence 8-3) p 33/1	Adam Beschizza	87
14Mar13	<b>Wol 9.5St</b> C4Hc 4K	9-7	1/8 (1¼L Lean On Pete 9-0) p 3/1	Joe Fanning	82
12Feb13	<b>Sth 7St/Slw</b> C3Hc 7K	8-9	3/9 (5¼L Docofthebay 8-10) p 11/4F	Joe Fanning	82
28Nov12	<b>Wol 8.5St</b> C4Hc 4K	9-0	1/10 (1½L Dubawi Island 9-4) p 15/2	Tom Eaves	78
10Nov12	<b>Don 7Gd</b> C5Hc 2K	9-0	1/18 (½L George Benjamin 8-8) p 13/2F	Jason Hart	73
20Oct12	<b>Cat 7Sft</b> C5Hc 2K	9-6	3/12 (7¼L Piceno 8-11) p 6/1	Tom Eaves	74
31Aug12	<b>Thi 7Sft</b> C4Hc 4K	9-5	2/10 (1¼L Fieldgunner Kirkup 9-7) p 12/1	Tom Eaves	73
18Aug12	<b>Don 7Gd</b> C5Hc 2K	9-10	1/10 (½L Steel Stockholder 9-0) p 7/1	Tom Eaves	68

11Aug12	<b>Ayr 7GF</b> C5Hc 2K	9-9	3/7 ( $\frac{3}{4}$ L Burnwynd Boy 8-9) p 7/2	Paul Mulrennan	67
23Jul12	<b>Ayr 6Sft</b> C5Hc 2K	9-12	3/7 ( $\frac{5}{2}$ L Sovereign Street 9-12) 8/1	Joe Fanning	70
09Jul12	<b>Ayr 6Sft</b> C5Hc 2K	9-6	6/7 ( $\frac{10}{2}$ L The Nifty Fox 9-4) h 9/4F	Joe Fanning	73
27Jun12	<b>CrI 8Sft</b> C4Hc 5K	9-7	8/10 (14L Lady Chaparral 9-9) p 12/1	Robert Winston	75
13Jun12	<b>Ham 6Gd</b> C4Hc 5K	9-3	4/10 ( $\frac{4}{4}$ L Julius Geezer 9-2) h <sup>1</sup> 14/1	Paul Mulrennan	76
31May12	<b>Ncs 7GF</b> C4Hc 4K	9-4	5/10 ( $\frac{8}{2}$ L Polish World 9-6) p 20/1	Royston Ffrench	78
08May12	<b>Cat 7GS</b> C4Hc 4K	9-5	9/11 (21L Green Howard 9-6) p 7/1	Joe Fanning	78
20Oct11	<b>Wol 7St</b> C5Hc 2K	9-4	1/11 ( $\frac{1}{2}$ L Ducal 9-2) p 11/2	Joe Fanning	73
15Oct11	<b>Cat 7Sft</b> C5Hc 2K	9-4	2/13 ( $\frac{1}{4}$ L Beckermat 9-3) p 5/1F	David Allan	73
11Oct11	<b>Ncs 6Sft</b> C5Hc 2K	9-4	2/14 ( $\frac{1}{2}$ L Toby Tyler 9-7) 12/1	Joe Fanning	73
25Sep11	<b>Mus 7GF</b> C4Hc 4K	8-13	4/10 ( $\frac{3}{2}$ L Fishforcompliments 9-1) 22/1	Joe Fanning	74
22Aug11	<b>Ham 8.5Gd</b> C5Hc 4K	9-6	14/15 (23L I'm Super Too 9-8) 16/1	Tom Eaves	75
30Jul11	<b>Ham 6Gd</b> C5Md 2K	9-3	1/7 (nk Vizean 8-12) 8/1	David Allan	—
13Jul11	<b>Cat 7Gd</b> C63yMd 2K	8-12	6/9 ( $\frac{4}{2}$ L Moral Issue 9-0) 15/2	Dale Swift	—



### Control horse nr 3 race record

- 7-y-o
- Trainer: Venetia Williams

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
29Dec14	<b>Nby 26.5GS</b> C3HcCh 7K	11-4	<b>6/7</b> ( <u>91L Knockanrawley 11-12</u> ) 12/1	Aidan Coleman	122
12Dec14	<b>Chl 26GS</b> C1HcChG3 25K	10-0	<b>PU/10</b> ( <u>Benbane Head 9-11</u> ) 16/1	Aidan Coleman	127
15Nov14	<b>Chl 27.5Sft</b> C1HcChG3 28K	10-9	<b>PU/14</b> ( <u>Sam Winner 11-12</u> ) 50/1	Aidan Coleman	130
02Aug13	<b>Gal 18Hy</b> HcH 6K	10-13	<b>2/18</b> ( <u>3¼L Reafadda 11-11</u> ) p 20/1	Mr D J O'Leary	97
14Jul13	<b>Sli 20Gd</b> HcH 6K	11-1	<b>9/12</b> ( <u>61L King High 11-8</u> ) tp 10/1	David Splaine	100
21Jun13	<b>Dro 20GF</b> HcH 4K	11-11	<b>11/19</b> ( <u>62L Miranour 11-0</u> ) p 7/1	Davy Condon	101
31May13	<b>Trm 21Gd</b> HcH 4K	11-12	<b>6/16</b> ( <u>36L John The Soldier 11-2</u> ) b <sup>1</sup> 10/1	Paul Townend	102
05May13	<b>Sli 20Sft/Hy</b> HcH 6K	11-9	<b>PU/8</b> ( <u>Personal Shopper 10-1</u> ) p 7/4F	Davy Condon	102
01Apr13	<b>Fai 22.5Y/Sft</b> NvHcCh 8K	11-4	<b>F/12</b> ( <u>Solstice Knight 10-12</u> ) p 9/2	Davy Russell	123
16Mar13	<b>Dro 20Hy</b> Ch 4K	11-3	<b>1/10</b> ( <u>3L Royal Sam 11-9</u> ) p 5/1	Davy Condon	—
06Mar13	<b>Dpt 18Gd/Y</b> NvHcH 5K	11-5	<b>3/7</b> ( <u>5L Khan Tengri 10-6</u> ) tp 5/1	Davy Russell	102
27Feb13	<b>Fai 23Sft</b> HcH 5K	11-4	<b>6/13</b> ( <u>58L Maccas Lad 10-13</u> ) t 7/2J	Davy Russell	102
26Dec12	<b>Lim 22Hy</b> MdH 6K	11-8	<b>3/10</b> ( <u>33L Kilcrea 11-12</u> ) 11/4	Davy Russell	—
05Dec12	<b>Wex 18Sft/Hy</b> MdH 4K	11-4	<b>3/14</b> ( <u>16L Venture Capital 11-12</u> ) t 7/1	Davy Russell	—
31Oct12	<b>Pun 22Hy</b> MdH 5K	11-7	<b>PU/8</b> ( <u>Jupiter 11-7</u> ) 100/30F	Davy Russell	—
21Oct12	<b>Naa 19Hy</b> MdH 6K	11-8	<b>4/11</b> ( <u>12½L Special Bar 11-12</u> ) 3/1	Davy Condon	—
11Mar12	<b>Bcl 24Sft</b> 4yPTP	11-7	<b>2/5</b> ( <u>1L Calibre Style 10-11</u> ) 3/1	J T McNamara	—
26Feb12	<b>Ben 20Y</b> 4yMdPTP	11-7	<b>6/10</b> ( <u>17½L Sizing Rio 11-7</u> ) 5/2	J T McNamara	—

### Control horse nr 4 race record

- 9-y-o
- Trainer: Desmond McDonogh

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
30Nov13	<b>Fai 20Gd/Y</b> HcH 5K	10-13	<b>6/24</b> (4L Followmeuptocarlow 11-11) 11/1	A E Lynch	102
23Nov13	<b>Gow 20Gd/Y</b> HcH 5K	11-3	2/13 (3L Emily Gray 11-2) 5/1	A E Lynch	100
30Oct13	<b>Pun 20Y/Sft</b> HcH 4K	11-5	2/19 (3L Mrs Mac Veale 11-7) 7/1	A E Lynch	95
17Oct13	<b>Pun 20Gd</b> HcH 5K	10-1	2/17 (3½L Tabhachtach 11-0) 12/1	A E Lynch	91
24Sep13	<b>Bal 20Gd</b> HcH 3K	10-11	1/16 (hd Go Paddy Go 11-6) 14/1	Jody McGarvey	85
27May13	<b>Bal 16Y/Sft</b> HcH 4K	10-5	7/12 (11L Norah Starr 11-11) 9/1	Ryan Treacy	87
30Apr13	<b>Bal 20Sft</b> HcH 3K	10-12	7/12 (68L Ballyreesode 11-9) 5/1	Jody McGarvey	88
19Apr13	<b>Wex 20Sft</b> HcH 8K	9-3	4/14 (11½L Barneys Honour 11-5) 14/1	Shane Crimin	91
03Apr13	<b>Dpt 18Gd</b> HcH 5K	9-12	2/8 (5½L Paddy O Dee 10-13) 6/1	Shane Crimin	85
19Feb13	<b>Nav 16Hy</b> HcH 7K	9-13	8/17 (24L Edmundo 9-9) 10/1	Shane Crimin	86
13Jan13	<b>Nav 16Hy</b> HcH 5K	9-12	4/15 (21L Barneys Honour 11-5) 14/1	Ryan Treacy	87
31Dec12	<b>Pun 16Hy</b> HcH 5K	10-11	1/15 (shd Corbally 11-8) 10/1	Ryan Treacy	82
30Nov12	<b>Thu 18Sft</b> HcH 5K	10-11	9/15 (42L Rating Queen 10-12) 5/1	Shane Crimin	84
25Nov12	<b>Nav 16Hy</b> HcH 5K	9-8	5/19 (12L Misca Musca 10-11) 9/1	Shane Crimin	84
15Nov12	<b>Clo 16.5Sft</b> HcH 6K	10-10	4/9 (6½L Chu Chu Thomas 11-9) 12/1	Shane Crimin	84
01Nov12	<b>Clo 16.5Sft</b> HcH 4K	10-9	5/17 (14½L Chu Chu Thomas 11-7) 12/1	Jody McGarvey	85
13Oct12	<b>Fai 20Sft/Hy</b> HcH 4K	10-9	10/16 (69L Underdefloorboards 11-7) 9/2	Jody McGarvey	85
26Sep12	<b>Dpt 18Sft</b> HcH 4K	10-4	1/14 (¾L Fitzgutentyte 10-9) 33/1	Jody McGarvey	80
03Sep12	<b>Ros 20Y/Sft</b> HcH 5K	9-8	14/15 (83L Cherryantor 10-0) 25/1	S J Hassett	80
03Apr12	<b>Thu 22GF</b> HcH 4K	10-12	8/12 (14½L Whats Up Britta 11-7) 20/1	John Cullen	81
17Mar12	<b>Dro 20Sft</b> HcH 5K	10-10	10/19 (35L Smile Crocodile 11-7) 25/1	Paul Callaghan	83
07Mar12	<b>Dpt 18Y/Sft</b> HcH 4K	11-0	UR/15 (Call Box 11-0) 20/1	John Cullen	83
11Feb12	<b>Naa 16Sft/Hy</b> HcH 5K	9-13	10/19 (23L Colls Corner 11-7) 33/1	Andrew P Thornton	85
24Nov11	<b>Thu 16Hy</b> MdH 4K	10-13	7/13 (35L Is Herself About 10-13) 50/1	John Cullen	—
27Oct11	<b>Clo 20Sft</b> MdH 4K	10-13	8/17 (28L A Little Swifter 10-8) 50/1	John Cullen	—
08Oct11	<b>Fai 16Gd</b> MdH 5K	11-2	14/16 (119L Leceile 11-7) 66/1	Paul Callaghan	—
04May11	<b>Pun 18Gd</b> NHF 5K	11-4	22/25 (134+L Golanbrook 11-7) 100/1	Mr J T Carroll	—

## Control horse nr 5 race record

- 9-y-o
- Trainer: Brian Ellison

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
25Jan15	<b>Sed 20Sft</b> C3HcCh 6K	11-9	6/9 (47L Sa Suffit 11-9) 22/1	Danny Cook	134
26Aug14	<b>Bal 17GF</b> Ch 8K	11-12	5/5 (96L Fosters Cross 11-2) tp 16/1	Davy Condon	132
18Jul14	<b>Klb 25Gd</b> HcCh 27K	11-10	<b>PU/12</b> (Caim Hill 11-4) tb <sup>1</sup> 16/1	Davy Russell	133
08Mar14	<b>Gow 18Sft</b> HcCh 27K	11-5	<b>PU/10</b> (Instant Impacked 9-12) tp 12/1	Bryan Cooper	133
16Feb14	<b>Nav 17Hy</b> NvChG2 20K	11-7	3/5 (60L Bright New Dawn 11-4) tp 16/1	Davy Condon	134
01Feb14	<b>Fai 21.5Hy</b> Ch 10K	11-7	3/5 (4¼L Lion Na Bearnai 11-4) tp 9/2	Davy Russell	134
19Jan14	<b>Fai 17Sft</b> HcCh 50K	10-11	<b>PU/13</b> (Turban 11-2) tp 14/1	Robbie Colgan	135
26Dec13	<b>Lim 19.5Sft</b> NvChG2 19K	11-9	6/7 (59L The Paparrazi Kid 11-6) t 6/1	Keith Donoghue	138
17Nov13	<b>Pun 16Y</b> NvChG2 20K	11-7	4/8 (25L Felix Yonger 11-4) t 7/1	Bryan Cooper	140
27Oct13	<b>Gal 17Hy</b> NvChG3 15K	11-1	1/5 (2½L Clar Na Mionn 11-1) t 5/4F	Davy Russell	—
12Oct13	<b>Fai 16GF</b> Ch 4K	11-12	1/10 (½L Usa 11-12) t EvensF	Davy Russell	—
23Apr13	<b>Pun 16Sft</b> HcH 15K	10-13	8/20 (7¼L Il Fenomeno 10-6) t 9/1	Davy Russell	137
03Apr13	<b>Dpt 18Gd</b> H 5K	11-8	1/7 (6L Rattan 11-12) t 6/5F	Davy Russell	137
10Mar13	<b>Naa 16Sft</b> NvHL 13K	11-9	2/10 (1¼L Mallowney 11-9) t 7/1	Davy Russell	136
07Feb13	<b>Clo 22Hy</b> NvHG3 15K	11-5	5/7 (30L Inish Island 11-2) t 4/1	Davy Russell	137
12Jan13	<b>Pun 20Hy</b> H 7K	11-10	2/4 (2¼L Si C'Etait Vrai 11-6) t 5/4F	Davy Russell	132
21Nov12	<b>Fai 16Sft</b> H 5K	11-12	1/9 (3L Turban 11-12) t 2/1	Davy Russell	118
28Oct12	<b>Gal 16Y/Sft</b> MdH 6K	11-12	1/5 (3¾L Rory O'Moore 11-12) t 9/2	Davy Russell	111
18Jul12	<b>Kln 22Gd/Y</b> HcH 12K	10-1	7/9 (18½L Black Benny 10-13) 7/1	Ben Dalton	113
07Jul12	<b>Bel 24Sft</b> MdH 4K	11-4	3/12 (16½L Civena 10-11) p 4/6F	Davy Russell	116
14May12	<b>Kln 22Gd</b> MdH 4K	11-4	2/16 (hd Dark Raven 10-13) t 11/8F	Davy Russell	116
19Apr12	<b>Tip 24Sft</b> MdH 4K	11-4	2/20 (11L You Must Know Me 11-4) p 15/8F	Davy Russell	116
03Apr12	<b>Thu 24GF</b> MdH 4K	11-4	2/17 (hd Dizzy Rascal 10-8) 4/5F	Davy Russell	121
29Dec11	<b>Leo 20Sft</b> MdH 6K	11-12	4/8 (9¾L Star Neuville 11-5) 13/2	Davy Russell	—
22Dec11	<b>Thu 22.5Hy</b> MdH 6K	11-4	4/9 (41L Archie Meade 11-4) 5/4F	Davy Russell	—
27Nov11	<b>Nav 16Sft/Hy</b> MdH 8K	11-12	3/25 (11L Formidableopponent 11-9) 9/2	Davy Russell	—
06Nov11	<b>Cor 20Sft</b> MdH 8K	11-12	6/20 (25L Jetson 11-12) 13/2	Davy Russell	—
09Mar11	<b>Naa 19Y</b> NHF 4K	12-0	2/12 (hd Pride Of The Artic 11-7) 7/4F	Ms N Carberry	—
23Jan11	<b>Leo 16Sft</b> NHF 4K	11-12	7/8 (38L Mart Lane 11-7) 4/5F	Robbie McNamara	—
18Apr10	<b>Drh 24Gd</b> 4yPTP	11-7	1/12 (1L Jack Bene 11-7) 3/1	Derek O'Connor	—
14Mar10	<b>Hrj 24GF</b> 4yPTP	11-7	6/7 (25L Invictus 11-7) 3/1	J A Ryan	—

## Control horse nr 6 race record

- 8-y-o
- Trainer: A L T Moore

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
18Jan15	<b>Leo 21Sft</b> HcCh 46K	9-10	8/15 (30L Foxrock 11-8) 16/1	Peter Carberry	123
26Dec14	<b>Leo 17Sft</b> HcCh 13K	10-4	2/12 (4¼L Forty Foot Tom 10-0) p 9/2F	D J Casey	120
29Nov14	<b>Fai 17Y/Sft</b> HcCh 27K	10-0	6/13 (10L Mister Hotelier 10-5) 10/1	D J Casey	121
01Nov14	<b>Dro 16Y</b> HcH 21K	9-11	15/16 (30L Stocktons Wing 11-4) 20/1	Robbie Colgan	110
01May14	<b>Pun 16Y</b> HcCh 27K	10-2	PU/16 (Mallowney 11-4) 20/1	D J Casey	123
06Apr14	<b>Fai 17Sft</b> NvHcCh 27K	10-13	8/13 (59L Some Tikket 11-3) 13/2	Davy Russell	124
08Mar14	<b>Gow 18Sft</b> HcCh 27K	10-10	3/10 (13½L Instant Impacked 9-12) 5/2F	Davy Russell	124
26Jan14	<b>Leo 17Hy</b> HcCh 8K	11-4	1/8 (9L Golden Ticket 11-3) 2/1F	Davy Russell	115
05Jan14	<b>Naa 16Sft</b> HcCh 8K	11-2	2/9 (1¼L Luke's Benefit 11-1) 9/4F	Davy Russell	113
05Dec13	<b>Clo 16Gd/Y</b> Ch 4K	11-12	2/6 (11L Is Herself About 11-5) 7/2	B M Cash	—
28Oct13	<b>Naa 16Y/Sft</b> Ch 7K	11-12	5/9 (70L Defy Logic 11-12) 14/1	B M Cash	—
31Jul13	<b>Gal 20Sft</b> HcH 8K	11-2	14/19 (131L Pyrus Gold Wind 10-13) 11/2F	Davy Russell	113
17May13	<b>Klb 20Y/Sft</b> Ch 4K	11-12	4/14 (15½L Datokepe 11-9) 25/1	B M Cash	—
24Apr13	<b>Pun 20Sft</b> HcH 14K	10-13	11/25 (25L Beau Michael 11-7) 14/1	Gareth Malone	114
31Mar13	<b>Fai 16Sft</b> NvHcH 8K	10-8	3/12 (½L Sammy Black 10-13) 12/1	Gareth Malone	110
16Mar13	<b>Lim 16Hy</b> HcH 5K	11-0	5/10 (19½L Whiskey And Rye 10-13) 4/1J	Gareth Malone	111
13Feb13	<b>Thu 16Hy</b> HcH 5K	11-6	3/11 (7¼L Luke's Benefit 10-8) 4/1F	Davy Russell	110
24Jan13	<b>Gow 17Hy</b> HcH 9K	11-1	6/11 (44L Rory Anna 11-8) 7/2	Gareth Malone	111
28Dec12	<b>Leo 16Sft</b> NvHcH 6K	10-11	4/14 (4L Flying Light 11-5) 4/1	Gareth Malone	110
13Dec12	<b>Gow 16Sft</b> NvHcH 6K	11-0	1/10 (2L Call Rog 11-4) 9/4F	Davy Russell	103
24Nov12	<b>Gow 16Hy</b> HcH 4K	11-2	1/12 (5L Whatdreamsrnadeof 11-6) 7/2J	Gareth Malone	92
08Apr12	<b>Fai 16Gd</b> NvHcH 8K	9-11	11/17 (54L Eightybarackstreet 11-9) 8/1	Tommy Treacy	94
10Mar12	<b>Gow 16Sft</b> HcH 5K	10-12	6/20 (21L Owennacurra Milan 11-7) 25/1	Tommy Treacy	95
11Feb12	<b>Naa 16Sft/Hy</b> MdH 5K	11-12	14/24 (37L Bat Masterson 10-13) 66/1	Tommy Treacy	—
19Jan12	<b>Thu 16Sft</b> MdH 4K	11-4	11/17 (139L Argocat 10-5) 50/1	Tommy Treacy	—
26Dec11	<b>Dro 16Hy</b> MdH 4K	11-4	8/19 (26L Rocky Wednesday 11-9) 12/1	Tommy Treacy	—
25May11	<b>Pun 16Gd</b> MdH 5K	11-4	21/24 (45L Great Value 11-9) 33/1	D J Casey	—

### Control horse nr 7 race record

- 9-y-o
- Trainer: N W Alexander

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
16Jan15	<b>Mus 24GS</b> C5HcCh 3K	10-7	2/7 (4½L Beau Dandy 10-9) t 18/1	Stephen Mulqueen	81
03Jan15	<b>Ncs 20Sft</b> C5HcCh 2K	11-4	5/6 (32L Boric 11-12) t 9/1	Lucy Alexander	90
14Dec14	<b>CrI 20Hy</b> C4HcCh 3K	11-1	PU/8 (Romany Ryme 11-7) t 18/1	Lucy Alexander	93
12Nov14	<b>Ayr 24.5GS</b> C4HcH 3K	11-2	PU/5 (Maggie Blue 9-13) t 17/2	Lucy Alexander	105
27May14	<b>Hex 20.5Sft</b> C4HcH 4K	10-10	1/5 (nk High Fair 9-7) t 9/2	Lucy Alexander	99
07May14	<b>Kel 21.5Gd</b> C3HcCh 9K	10-0	5/7 (32L Baileys Concerto 10-10) t 12/1	Lucy Alexander	98
07Apr14	<b>Kel 21.5Sft</b> C4HcCh 3K	10-9	2/4 (14L Lady Of Verona 10-2) t 7/1	Lucy Alexander	103
18Feb14	<b>Wet 22.5Hy</b> C4NvHcCh 4K	11-8	PU/8 (Legendary Hop 11-2) t 13/2	Lucy Alexander	105
04Jan14	<b>Ncs 20Hy</b> C4NvH 3K	11-1	3/4 (3½L Retrieve The Stick 11-8) t 5/2	Diarmuid O'Regan	105
21Dec13	<b>Ncs 16Sft</b> C4HcH 3K	10-7	4/8 (13L Sparkling Hand 10-6) t 9/2	Diarmuid O'Regan	105
08Dec13	<b>Kel 22.5GS</b> C4NvH 3K	11-3	5/7 (12½L Tonvadosa 10-10) t 10/1	Lucy Alexander	100
02Nov13	<b>Ayr 24.5Sft</b> C4HcH 3K	10-10	PU/9 (Amore Mio 11-0) 17/2	Mr Kit Alexander	101
29May13	<b>CrI 22Sft</b> C5MdH 2K	11-0	1/6 (1¼L Polly Hopper 11-0) 7/2	Lucy Alexander	—
27Mar13	<b>Wet 16.5Sft</b> C5MdH 1K	10-7	7/12 (15½L Discovery Bay 11-0) 33/1	Lucy Alexander	—
05Mar13	<b>Ncs 16Sft</b> C4NvH 3K	10-8	8/14 (39L Runswick Royal 10-13) 40/1	James Reveley	—
15Feb12	<b>Kel 16.5GS</b> C5NHF 2K	11-1	5/11 (19½L Brijomi Queen 10-5) 33/1	Felix De Giles	—
28Jan12	<b>Don 16.5GS</b> C5NHF 2K	11-0	7/12 (11L Diligent 10-3) 15/2	Sam Thomas	—

### Control horse nr 8 race record

- 7-y-o
- Trainer: Noel Meade

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
15Oct14	<b>Pun 20GF</b> HcCh 8K	11-8	5/6 (84L <u>Elegant Statesman 11-1</u> ) b 12/1	Paul Carberry	121
27Sep14	<b>Nav 20GF</b> Ch 10K	11-2	3/3 (31L <u>Nearly Nama'd 11-2</u> ) 4/1	Paul Carberry	—
23Nov13	<b>Gow 20Gd/Y</b> Ch 10K	11-0	4/4 (69L <u>Buckers Bridge 11-10</u> ) 12/1	Paul Carberry	125
03Oct13	<b>Clo 24Y</b> NvCh 10K	11-2	6/6 (32L <u>Heaney 11-5</u> ) p 10/1	Davy Condon	127
13Sep13	<b>Dro 18GF</b> Hc 5K	8-7	9/16 (22L <u>Fisher Bridge 8-13</u> ) p 7/1	Conor Hoban	62
29Aug13	<b>Kln 20.5Gd</b> NvCh 6K	11-8	7/10 (56L <u>Spring Heeled 11-5</u> ) 20/1	Davy Condon	130
23Aug13	<b>Wex 16Gd/Y</b> Hc 3K	9-9	8/15 (32L <u>Celestial Prospect 9-12</u> ) 6/1	Conor Hoban	63
21Jun13	<b>Dro 20GF</b> Ch 4K	11-6	1/14 (hd <u>Plan A 11-12</u> ) 14/1	Davy Condon	—
18May13	<b>Wex 14GF</b> Hc 5K	8-12	3/6 (1¾L <u>Takeyourcapoff 9-3</u> ) p 9/4J	Conor Hoban	63
01Apr13	<b>Fai 22Y</b> HcH 12K	10-9	13/17 (53L <u>Brian Who 9-7</u> ) p 33/1	Davy Condon	118
08Mar13	<b>Dun 16St</b> Hc 5K	11-2	5/13 (7¾L <u>Rodriguez 11-4</u> ) 13/8F	Ms N Carberry	63
01Mar13	<b>Dun 12St</b> Hc 3K	9-7	4/14 (2L <u>Mad For Road 8-8</u> ) 8/1	Conor Hoban	63
29Dec12	<b>Leo 24Sft</b> HcH 13K	9-12	25/30 (72L <u>Prince Rudi 10-6</u> ) 33/1	Davy Condon	119
08Dec12	<b>Nav 23Hy</b> HcH 14K	10-4	15/19 (96L <u>Roi Du Mee 9-13</u> ) 20/1	Paul Carberry	120
01Dec12	<b>Fai 16Sft</b> HcH 20K	10-4	9/14 (23L <u>King Of Queens 10-12</u> ) 5/1	Davy Condon	121
03Nov12	<b>Dro 16Y/Sft</b> HcH 21K	10-0	4/13 (7¼L <u>Beef To The Heels 9-3</u> ) 7/1	Davy Condon	121
18Sep12	<b>Lis 16Hy</b> 4yHcH 24K	10-12	11/16 (49L <u>Burrenbridge Lodge 11-5</u> ) 11/2F	Paul Carberry	122
14Sep12	<b>Dro 18Y</b> Hc 5K	7-13	1/16 (¾L <u>Action Master 8-10</u> ) 6/1	Conor Hoban	55
10Apr12	<b>Fai 16GS</b> 4yHG3 15K	11-0	7/11 (19L <u>Ballynacree 11-0</u> ) 25/1	Barry Geraghty	122
14Mar12	<b>Chl 16.5Gd</b> C14yHcHG3 34K	11-1	18/24 (41L <u>Une Artiste 10-8</u> ) b <sup>1</sup> 100/1	Paul Carberry	129
21Jan12	<b>Naa 16Sft/Hy</b> HcH 8K	10-10	4/10 (7¼L <u>Pass The Hat 11-3</u> ) 6/1	Davy Condon	123
26Dec11	<b>Leo 16Y/Sft</b> 3yHG2 23K	10-12	4/8 (4L <u>His Excellency 10-12</u> ) 33/1	Emmet McNamara	—
19Nov11	<b>Pun 16Sft</b> 3yH 7K	11-3	5/7 (46L <u>One Cool Shabra 10-10</u> ) 7/2	Paul Carberry	—
04Nov11	<b>Dro 16Sft</b> 3yMdH 8K	10-12	1/16 (½L <u>Experimentalist 10-9</u> ) 15/2	Davy Condon	—
20Oct11	<b>Thu 16Gd</b> 3yMdH 4K	10-12	3/18 (8½L <u>Thegondolier 10-12</u> ) 10/1	Paul Carberry	—
12Oct11	<b>Pun 16Y/Sft</b> 3yMdH 5K	10-12	6/18 (17½L <u>Hollymount King 10-12</u> ) 13/2	Paul Carberry	—
12Jul11	<b>Dun 12St</b> Hc 5K	8-7	6/10 (14L <u>Formal Bid 8-13</u> ) 8/1	Sam James	63
03Jul11	<b>Bel 14GF</b> Hc 3K	8-13	5/14 (7¼L <u>Action Master 9-12</u> ) 16/1	Declan McDonogh	64
24Jun11	<b>Cur 12Sft</b> 11K	8-6	7/11 (22L <u>Sportsmaster 9-0</u> ) 25/1	Samantha Bell	67
12Jun11	<b>Ros 10Gd/Y</b> 3y 5K	9-5	6/12 (10L <u>Sportsmaster 9-2</u> ) 16/1	Declan McDonogh	70
29Apr11	<b>Dun 7St</b> 3yHc 4K	9-0	10/14 (7L <u>Cheers Buddy 9-4</u> ) 16/1	Samantha Bell	70
12Aug10	<b>Leo 7GF</b> 2yMd 10K	9-0	8/9 (11½L <u>Fred Archer 9-0</u> ) 5/1	Declan McDonogh	—
21Jul10	<b>Naa 8Y</b> 2y 9K	9-3	3/12 (4L <u>Music In The Rain 9-3</u> ) 25/1	Declan McDonogh	—
09Jul10	<b>Gow 8Gd/Y</b> 2y 9K	9-3	9/11 (16½L <u>Brittany 9-3</u> ) 11/1	Declan McDonogh	—

### Control horse nr 9 race record

- 5-y-o
- Trainer: Gary Moore

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
07Oct14	<b>Bri 8Hy</b> C6Hc 1K	8-10	<b>8/9</b> (42L Byrd In Hand 9-0) b 12/1	Hector Crouch	60
23Sep14	<b>Lin 10St</b> C6Hc 2K	9-6	<b>13/13</b> (19L Sweet P 9-4) eb 7/2	Ryan Moore	60
08Sep14	<b>Bri 8Gd</b> C6Hc 1K	9-2	<b>2/8</b> (¾L Thomas Blossom 8-4) b 7/2J	Hector Crouch	60
24Jul14	<b>Lin 8St</b> C6MdHc 2K	9-3	<b>11/12</b> (22L Fruit Pastille 9-3) b 25/1	Louis Steward	62
23Jun14	<b>Lin 8St</b> C6Hc 2K	9-6	<b>6/9</b> (12L Prince Of Burma 9-7) b 9/2	Robert Havlin	64
27May14	<b>Lin 8St</b> C6Hc 2K	9-1	<b>5/12</b> (2½L Fearless Lad 9-3) b 14/1	Louis Steward	64
30Apr14	<b>Bri 8Gd</b> C5Hc 2K	9-6	<b>6/7</b> (9½L Little Indian 9-0) b 7/2J	Robert Havlin	66
12Mar14	<b>Kem 8St</b> C5Hc 2K	9-0	<b>4/5</b> (5¾L Tee It Up Tommo 9-5) b 10/1	Robert Havlin	67
21Feb14	<b>Lin 8St</b> C6Md 2K	9-13	<b>2/8</b> (1¼L Zamra 8-3) b <sup>1</sup> 6/1	Robert Havlin	67
23Jan14	<b>Kem 7St</b> C6Md 1K	9-7	<b>4/9</b> (3¼L Pactolus 8-10) p 5/1	Louis Steward	68
28Dec13	<b>Lin 8St</b> C5Md 2K	9-5	<b>5/12</b> (4½L Big Baz 9-5) p 20/1	Robert Havlin	72
11Dec13	<b>Lin 10St</b> C6Md 2K	9-5	<b>3/6</b> (19½L Vermont 9-5) 12/1	Robert Havlin	77
28Aug13	<b>Kln 8.5Gd</b> 4K	9-5	<b>3/9</b> (5L Piet Mondrian 9-5) 4/1	Chris Hayes	77
12Aug13	<b>Bal 9GF</b> 3y 4K	9-5	<b>2/7</b> (5½L Lady O Malley 9-0) 2/1F	Chris Hayes	—
30Jul13	<b>Gal 7Y</b> 3y 9K	9-5	<b>2/7</b> (nse Sister Slew 9-0) 8/1	Chris Hayes	—
26Jul13	<b>Dro 7GF</b> 4K	9-5	<b>5/10</b> (5½L Harpist 9-0) 25/1	Shane Foley	—

### Control horse nr 10 race record

- 6-y-o
- Trainer: Declan Carroll

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
29Oct14	<b>Not 8.5GS</b> C4Hc 5K	8-10	12/16 (7¼L Lightning Spear 9-4) h 25/1	David Allan	74
25Oct14	<b>Wol 8.5St</b> C6Cl 2K	8-10	6/9 (3½L Dialogue 8-11) h 8/1	Luke Leadbitter	74
23Sep14	<b>Bev 8.5GF</b> C5Hc 3K	9-4	2/11 (2¼L Blue Maisey 8-7) h 10/1	Neil Farley	74
16Sep14	<b>Thi 7Gd</b> C4Hc 4K	8-8	6/11 (3L Comino 8-9) h 20/1	Neil Farley	75
09Sep14	<b>Red 7GF</b> C5Hc 2K	9-6	7/14 (5¼L Broctune Papa Gio 9-0) h 15/2	Luke Leadbitter	75
02Aug14	<b>Thi 8Sft</b> C3Hc 19K	8-3	11/17 (15½L Osteopathic Remedy 9-4) h 20/1	Luke Leadbitter	76
29Jul14	<b>Bev 8.5GF</b> C4Hc 6K	8-13	3/7 (3¾L Shadowtime 9-7) h 15/2	Luke Leadbitter	76
15Jul14	<b>Bev 7.5Gd</b> C5Hc 3K	9-2	1/11 (½L Mishaal 9-9) h 9/1	Luke Leadbitter	70
04Jul14	<b>Bev 7.5GF</b> C6SI 2K	9-1	1/16 (½L Whispered Times 9-3) h 6/1	Luke Leadbitter	70
19Jun14	<b>Lei 8.5GF</b> C6Cl 1K	9-2	1/6 (1½L Licence To Till 8-13) h <sup>1</sup> 8/1	Adam Kirby	67
21May14	<b>Lin 7St</b> C6Cl 2K	9-2	8/8 (35L Seek The Fair Land 9-3) 4/1	Adam Kirby	69
19May14	<b>Lei 8.5GF</b> C6SI 1K	9-7	2/9 (1¾L Swift Cedar 9-7) 6/1	Adam Kirby	69
10May14	<b>War 7Sft</b> C5Hc 2K	8-11	5/6 (5½L Exzachary 8-9) 5/1	Eoin Walsh	70
26Apr14	<b>Wol 6St</b> C5Hc 2K	9-2	7/8 (4½L Desert Strike 9-7) 11/2	Eoin Walsh	70
25Nov13	<b>Wol 7St</b> C5Hc 2K	9-2	1/10 (½L Barbados Bob 8-12) 7/2F	George Baker	65
16Oct13	<b>Lin 7St</b> C6Cl 2K	8-2	2/12 (hd Four Winds 8-8) 12/1	Patrick Mathers	65
20Sep13	<b>Wol 7St/Slw</b> C6Cl 1K	9-2	3/10 (¾L Greensward 9-8) 6/1	Jimmy Quinn	70
28Aug13	<b>Sth 7St</b> C5Hc 2K	9-3	7/8 (11L Caldercruix 9-2) p 10/1	Daniel Tudhope	71
14Aug13	<b>Bev 7.5GF</b> C6Cl 2K	9-5	5/8 (8¾L Silverware 9-10) 5/1	George Chaloner	73
28Jul13	<b>CrI 8Sft</b> C5Cl 3K	9-5	3/6 (2¾L Extraterrestrial 9-2) 14/1	Barry McHugh	75
15Dec12	<b>Wol 8.5St</b> C6SI 2K	9-0	5/8 (25L Dozy Joe 9-2) p 13/8F	Jamie Spencer	75
08Oct12	<b>Pon 8GS</b> C53yCl 2K	8-9	4/4 (42L Marford Missile 8-7) 5/2	Paul Hanagan	78
29Sep12	<b>Chs 10.5Hy</b> C23yHc 31K	8-2	8/11 (7¼L Deia Sunrise 9-1) 25/1	James Sullivan	80
08Sep12	<b>Wol 7St</b> C5Cl 2K	9-8	3/10 (¾L Prime Exhibit 8-12) 4/1	Jack Mitchell	83
18Aug12	<b>Chs 6Gd</b> C33yHc 12K	9-1	6/6 (5¾L Chooseday 8-11) 2/1	Franny Norton	84
16Jul12	<b>Ayr 7Gd</b> C4Hc 4K	9-0	4/8 (6½L King Of Eden 9-9) 11/4F	Shane B Kelly	85
30Jun12	<b>Chs 7Gd</b> C23yHc 12K	8-9	2/9 (2L Van Ellis 9-7) 9/1	Ted Durcan	84
19May12	<b>Nmk 6GF</b> C23yHc 24K	8-8	14/16 (7¾L Mince 9-0) 16/1	Frederik Tylicki	85
10May12	<b>Chs 6Sft</b> C33yHc 9K	9-1	4/11 (½L Jack Dexter 8-11) 6/1	Sam Hitchcott	82
26Sep11	<b>Ham 6Sft</b> C52yHc 2K	9-7	1/6 (nk Blue Shoes 8-6) 11/4	Paul Hanagan	78
24Sep11	<b>Chs 5.5GS</b> C22yHc 9K	8-7	5/10 (2L Free Zone 8-8) 7/1	Jim Crowley	78
09Sep11	<b>Chs 7Gd</b> C32yHc 7K	8-6	2/7 (¾L Cravat 8-12) 13/2	Barry McHugh	79
22Aug11	<b>Ham 6Gd</b> C62yCl 1K	9-2	1/4 (2L Sonko 8-7) 8/13F	Paul Hanagan	—
14Aug11	<b>Pon 5GF</b> C42yMd 4K	9-3	4/9 (7½L Kune Kune 8-12) 4/1	Paul Hanagan	—
16Jul11	<b>Rip 5GS</b> C42yMd 4K	8-12	2/9 (1¾L See Clearly 8-12) 8/11F	Lee Topliss	—
02Jul11	<b>Bev 5GF</b> C52yMd 2K	8-13	2/11 (2¾L Springinmystep 9-3) 2/1	Paul Hanagan	—



### Control horse nr 11 race record

- 10-y-o
- Trainer: Gordon Elliott

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
22Feb14	<b>Fai 25Sft/Hy</b> ChG2 21K	11-10	<b>2/7</b> (12L On His Own 11-3) 13/8	Danny Mullins	160
26Dec13	<b>Kem 24Sft</b> C1ChG1 114K	11-10	<b>4/9</b> (17L Silviniaco Conti 11-10) 20/1	Danny Mullins	160
02Nov13	<b>Dro 24Y/Sft</b> ChG1 68K	11-10	<b>UR/6</b> (Roi Du Mee 11-10) 9/2	Danny Mullins	160
23Apr13	<b>Pun 25Sft</b> NvChG1 40K	11-10	1/8 (22L Tofino Bay 11-10) 14/1	Danny Mullins	147
31Mar13	<b>Fai 20Sft</b> ChG1 47K	11-10	<b>4/6</b> (5½L Realt Mor 11-10) 4/1	Danny Mullins	150
28Feb13	<b>Thu 18Sft</b> Ch 12K	11-0	1/8 (11L Lastoftheleaders 11-3) 11/4	Danny Mullins	142
26Jan13	<b>Leo 21Hy</b> NvChG2 21K	11-5	<b>4/6</b> (2¼L Texas Jack 11-5) 5/2	Davy Russell	144
06Jan13	<b>Naa 16Sft/Hy</b> NvCh 11K	11-8	<b>2/7</b> (hd Marito 11-8) 9/2	Paul Carberry	136
28Dec12	<b>Leo 24Sft</b> NvChG1 40K	11-10	<b>PU/12</b> (Back In Focus 11-10) 14/1	Davy Condon	136
01Dec12	<b>Fai 21.5Sft</b> Ch 6K	11-12	<b>1/7</b> (5L Mackeys Forge 11-12) 8/13F	Davy Condon	—
17Nov12	<b>Pun 20Hy</b> Ch 6K	11-12	<b>F/12</b> (El Fontan 11-12) 5/4J	Davy Condon	—
29Oct12	<b>Naa 16Sft</b> Ch 8K	11-12	<b>3/13</b> (5¼L Jenari 11-11) 6/4F	Davy Condon	—
16Mar12	<b>Chl 24Gd</b> C1NvHG1 56K	11-7	<b>7/20</b> (19½L Brindisi Breeze 11-7) 11/1	Paul Carberry	140
18Dec11	<b>Nav 20Sft/Hy</b> NvHG1 39K	11-10	<b>2/4</b> (4½L Boston Bob 11-10) 5/6F	Paul Carberry	—
27Nov11	<b>Nav 20Sft/Hy</b> NvHG2 21K	11-3	1/6 (1½L Rebel Fitz 11-6) 5/2	Davy Condon	—
03Nov11	<b>Thu 18Sft/Hy</b> MdH 4K	11-12	1/17 (2½L Golanbrook 11-12) 1/2F	Paul Carberry	—
22Oct11	<b>Gal 16Hy</b> MdH 6K	11-12	<b>SU/11</b> (Letter Of Credit 11-12) 5/4F	Paul Carberry	—
13Mar11	<b>Lim 19Sft</b> NHF 5K	11-11	1/6 (8L Lovethehigherlaw 12-0) 8/1	Mr A T Duff	—
24Feb11	<b>Thu 16Sft</b> NHF 4K	11-11	1/11 (7L Mozoltov 11-13) 5/2	Mr A T Duff	—
02Feb11	<b>Dro 16Y/Sft</b> NHF 4K	11-11	<b>4/18</b> (4L Open Up Your Heart 11-7) 11/2	Mr A T Duff	—
16Jan11	<b>Tin 24Sft</b> MdPTP	12-0	1/11 (4L Mazuri Cowboy 12-0) 6/4F	J P McKeown	—
30Dec10	<b>Drh 24Y/Sft</b> MdPTP	12-0	<b>2/17</b> (7L Captain Moonman 12-0) 7/1	J P McKeown	—

### Control horse nr 12 race record

- 7-y-o
- Trainer Gordon Elliott

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
01Jan15	<b>Fai 21.5Sft/Hy</b> Ch 6K	11-12	<b>PU/5</b> (Noble Emperor 11-12) 11/4	Davy Condon	—
06Dec14	<b>Nav 20Y/Sft</b> Ch 6K	11-12	<b>4/14</b> (39L Wounded Warrior 11-12) 12/1	Keith Donoghue	—
23Oct14	<b>Thu 22Gd</b> H 8K	11-6	<b>2/4</b> (3/4L He'llberemembered 11-1) 9/10F	Paul Carberry	134
06Apr14	<b>Fai 20Sft</b> NvHG2 21K	11-5	<b>8/13</b> (54L Lieutenant Colonel 11-5) 14/1	Davy Condon	135
08Mar14	<b>Ayr 24.5Hy</b> C4NvH 3K	11-10	<b>2/5</b> (1/2L I Need Gold 11-10) 8/11F	Davy Condon	138
20Feb14	<b>Clo 24Hy</b> NvHG3 17K	11-2	<b>PU/10</b> (Don Poli 10-13) 5/2F	Paul Carberry	137
26Jan14	<b>Leo 20Sft/Hy</b> NvHG2 21K	11-3	<b>2/6</b> (3/4L Sure Reef 11-0) 4/1	Paul Carberry	130
26Dec13	<b>Lim 19Hy</b> MdH 5K	11-12	<b>1/13</b> (9L Highbrow Blue 11-5) 1/2F	Keith Donoghue	—
20Nov13	<b>Fai 20Sft</b> MdH 4K	11-12	<b>F/15</b> (The Housekeeper 10-11) 7/2	Paul Carberry	—
02Nov13	<b>Dro 16Sft</b> NHF 4K	11-9	<b>1/10</b> (4 1/2L The Herds Garden 11-11) 3/1	Mr S Clements	—
10Mar13	<b>Lgs 24Sft/Hy</b> MdPTP	12-0	<b>1/10</b> (10L The Last Samuri 12-0) 3/1	J J Codd	—
20Jan13	<b>Bib 24Y/Sft</b> PTP	12-0	<b>PU/16</b> (Bendanella 12-0) 3/1	J J Codd	—
02Dec12	<b>Lsr 24Hy</b> 4yMdPTP	11-7	<b>2/15</b> (4L Sergeant Mattie 11-7) 6/1	J J Codd	—

### Control horse nr 13 race record

- 4-y-o
- Trainer: Ms Sheila Lavery

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
31Oct14	<b>Dun 6St</b> Hc 10K	8-13	<b>8/8</b> (9¼L Kernoff 9-5) h 14/1	Ronan Whelan	88
18Oct14	<b>Cor 6Y/Sft</b> Hc 8K	9-6	<b>2/13</b> (2½L Bubbly Bellini 9-5) h 8/1	Ronan Whelan	88
12Oct14	<b>Cur 6Y</b> L 21K	9-0	<b>8/9</b> (9¼L Viztoria 9-1) h 33/1	Ronan Whelan	88
03Oct14	<b>Dun 6St</b> 8K	9-0	<b>4/7</b> (3¾L My Good Brother 9-12) h 8/1	Pat Smullen	88
06Aug14	<b>Sli 6.5Sft</b> Hc 9K	9-7	<b>2/8</b> (hd Footprint 9-0) h 8/1	Ronan Whelan	87
22Jun14	<b>Gow 7GF</b> Hc 10K	9-2	<b>7/9</b> (3¼L Toccata Blue 9-3) h 12/1	Pat Smullen	88
29May14	<b>Fai 6Y/Sft</b> 3y 8K	9-2	<b>2/8</b> (¾L Pearl Earing 9-5) h 14/1	Ronan Whelan	76
23Oct13	<b>Nav 6Sft</b> 2yHc 8K	8-9	<b>1/3</b> (2¾L Meebo 7-8) h 4/5F	Rory Cleary	76
29Sep13	<b>Cur 6Gd</b> 2yL 21K	8-12	<b>7/8</b> (17L Shining Emerald 9-3) h 33/1	Billy Lee	76
15Sep13	<b>Cur 6Gd</b> 2yHc 7K	8-4	<b>1/4</b> (3½L Candy Apples 9-0) h 9/4	Rory Cleary	65
04Sep13	<b>Gow 7GF</b> 2yHc 5K	8-7	<b>2/7</b> (½L Ruler Of France 9-10) h 20/1	Rory Cleary	63
19Aug13	<b>Ros 7Gd</b> 2y 7K	9-0	<b>9/11</b> (6¾L Billboard 9-5) h 33/1	Rory Cleary	—
09Aug13	<b>Tip 5Y</b> 2y 5K	9-0	<b>7/14</b> (7¼L Hurryupharriet 9-0) h 20/1	Rory Cleary	—
27Jun13	<b>Tip 5GF</b> 2y 7K	9-0	<b>5/9</b> (9L Abbakova 9-0) h <sup>1</sup> 50/1	Michael Hussey	—

### Control horse nr 14 race record

- 9-y-o
- Trainer: S J Mahon

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
07Oct14	<b>Tip 23Gd</b> Ch 5K	11-12	<b>PU/6</b> ( <u>Perfect Gentleman 11-12</u> ) tp 20/1	<u>Denis O'Regan</u>	110
27Sep14	<b>Nav 20GF</b> Ch 6K	11-12	<b>2/8</b> ( <u>20L Rawnaq 11-12</u> ) tp 20/1	<u>Denis O'Regan</u>	112
04Jun14	<b>Pun 22Gd/Y</b> Ch 10K	11-0	<b>7/9</b> ( <u>65L Away We Go 11-0</u> ) b 150/1	<u>Robbie Colgan</u>	112
06May14	<b>Fai 21.5GF</b> Ch 6K	11-12	<b>7/14</b> ( <u>82L Pageboy 11-12</u> ) b <sup>1</sup> 50/1	<u>Robbie Colgan</u>	116
20Mar14	<b>Thu 22Hy</b> Ch 5K	11-12	<b>PU/8</b> ( <u>Coole Avenue 11-5</u> ) p 10/1	<u>Paul Carberry</u>	116
01Jan14	<b>Fai 21.5Sft/Hy</b> Ch 6K	11-12	<b>6/9</b> ( <u>81L Civena 10-12</u> ) t 9/1	<u>Paul Carberry</u>	—
08Dec13	<b>Pun 20Gd/Y</b> Ch 7K	11-12	<b>4/12</b> ( <u>18L Bright New Dawn 11-12</u> ) 66/1	<u>John Cullen</u>	—
31Mar13	<b>Qua 24Gd/Y</b> PTP	12-0	<b>9/12</b> ( <u>25L All Or Now 11-9</u> ) 7/2	<u>Derek O'Connor</u>	—
10Mar13	<b>Bcl 24Y</b> MdPTP	12-0	<b>1/10</b> ( <u>4L Dromore Express 12-0</u> ) 1/2F	<u>Derek O'Connor</u>	—
03Feb13	<b>Bel 24Sft</b> CnfPTP	12-0	<b>2/8</b> ( <u>1L Cnoc Na Gcon 11-9</u> ) 4/6F	<u>Derek O'Connor</u>	—
22Aug12	<b>Nab 26.5Gd</b> C3NvCh 6K	10-13	<b>4/5</b> ( <u>80L Prince Tom 11-8</u> ) 16/1	<u>Ian Popham</u>	—
28Nov11	<b>Ffo 16Sft</b> C6NHF 1K	11-0	<b>2/5</b> ( <u>20L Ashes House 11-0</u> ) 6/5F	<u>Alain Cawley</u>	—
07May11	<b>Pun 17Gd</b> NHF 5K	11-7	<b>7/22</b> ( <u>10½L Shu Lewis 11-2</u> ) 33/1	<u>Mr W W McMahon</u>	—

### Control horse nr 15 race record

- 9-y-o
- Trainer: D McNamara

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
01Feb15	<b>Bel 24Gd/Y</b> PTP	12-2	<b>8/18</b> (27L Grey Brief 12-2) 8/1	D Skehan	—
04Oct14	<b>Gow 18Y</b> Ch 6K	11-12	<b>7/8</b> (68L Benemeade 11-12) t 50/1	John Cullen	—
27Sep14	<b>Nav 23Gd</b> HcH 4K	10-11	<b>14/24</b> (26L Carmels Boy 10-9) t 16/1	A E Lynch	80
11Sep14	<b>Clo 20Gd</b> HcH 4K	10-12	<b>6/16</b> (17½L Pierlow 11-6) t 25/1	John Cullen	81
31Aug14	<b>Cor 20Gd</b> HcH 4K	10-2	<b>BD/21</b> (Razia 10-8) t 25/1	Ian McCarthy	81
14Jul14	<b>Dpt 23Gd/Y</b> HcH 4K	10-12	<b>SU/13</b> (I C Gold 11-4) t 16/1	A E Lynch	81
18Jun14	<b>Wex 18GF</b> HcH 4K	11-3	<b>6/14</b> (36L Key Account 11-5) ht <sup>1</sup> 14/1	A P Heskin	84
12May14	<b>Kln 22Y</b> HcH 6K	9-13	<b>PU/17</b> (Some Hawk 11-6) 25/1	A P Heskin	88
08Oct13	<b>Tip 24Gd</b> HcH 4K	11-2	<b>PU/19</b> (Moon Prince 10-7) 20/1	A E Lynch	92
11Aug13	<b>Dpt 18Gd</b> HcH 3K	11-12	<b>6/13</b> (34L Pink Goddess 11-3) 9/1	B M Cash	95
18Jul13	<b>Kln 17GF</b> NvH 5K	11-6	<b>8/11</b> (38L Shamar 11-12) 50/1	B M Cash	—
07Jul13	<b>Lim 16GF</b> MdH 5K	11-12	<b>8/18</b> (37L River Slaney 11-12) 33/1	B M Cash	—
24Jun13	<b>Klb 24GF</b> NvH 5K	11-3	<b>6/10</b> (12L Akatara 10-10) 50/1	B M Cash	—
16Mar13	<b>Lim 21Hy</b> MdH 5K	11-12	<b>PU/12</b> (Pencilhimin 11-12) 25/1	B M Cash	—
27Jan13	<b>Nen 24Hy</b> MdPTP	12-0	<b>F/11</b> (Major Mongo 12-0) 4/1	B M Linehan	—
26Jul12	<b>Lim 19.5Gd</b> Ch 7K	11-9	<b>10/15</b> (97L Ploopluck Bridge 10-5) 25/1	Robert Dunne	—

### Control horse nr 16 race record

- 8-y-o
- Trainer: H Rogers

DATE	RACE CONDITIONS	WGT	RACE OUTCOME	JOCKEY	OR
21May14	<b>Sli</b> 20Sft HcH 4K	11-5	<b>PU/16</b> ( <u>Lady Olwyn 11-0</u> ) tp 16/1	Mark Enright	88
12Apr14	<b>Nav</b> 13Y/Sft Hc 4K	8-5	<b>7/17</b> ( <u>6L Hazariban 9-2</u> ) p 25/1	Danny Grant	47
11Apr14	<b>Wex</b> 24Y/Sft HcH 4K	11-0	<b>6/16</b> ( <u>16L Seven Acres 10-11</u> ) p 12/1	Mark Enright	90
29Mar14	<b>Nav</b> 20Sft/Hy HcH 5K	9-13	<b>4/16</b> ( <u>6L Allez Vic 10-7</u> ) tp 16/1	Mark Enright	89
22Jan14	<b>Fai</b> 16Sft/Hy HcH 4K	11-6	<b>4/16</b> ( <u>9½L Misty Lady 11-0</u> ) tp 10/1	Davy Russell	89
29Dec13	<b>Lim</b> 18Hy HcH 4K	10-11	<b>10/14</b> ( <u>34L Federici 11-8</u> ) tp 6/1	David Splaine	90
21Dec13	<b>Nav</b> 16Sft/Hy HcH 5K	10-7	<b>5/14</b> ( <u>14L Wither Hills 11-8</u> ) tp 5/1J	A E Lynch	90
06Nov13	<b>Fai</b> 16Sft HcH 5K	10-6	<b>3/12</b> ( <u>4½L College Boy 11-7</u> ) tp 25/1	A E Lynch	89
09Oct13	<b>Nav</b> 10Y Hc 5K	8-4	<b>16/17</b> ( <u>27L Dysios 9-1</u> ) tp 25/1	N G McCullagh	56
20Sep13	<b>Lis</b> 9Hy Hc 6K	8-4	<b>7/13</b> ( <u>12½L Modista 9-11</u> ) tp 20/1	N G McCullagh	53
22Aug12	<b>Bel</b> 12Sft 4K	11-1	<b>8/8</b> ( <u>30L Blackstairmountain 11-5</u> ) t 16/1	Mr L Grendon	56
06Aug12	<b>Naa</b> 16Y/Sft HcH 5K	10-10	<b>8/12</b> ( <u>27L Clancy Strand 10-12</u> ) t 11/1	Keith Donoghue	96
16Jul12	<b>Dun</b> 10.5St Hc 3K	9-6	<b>13/14</b> ( <u>15L Cebuano 10-1</u> ) tb <sup>1</sup> 14/1	F M Berry	57
12Jul12	<b>Leo</b> 12Sft Hc 4K	9-3	<b>7/9</b> ( <u>11L Beach Of Falesa 9-0</u> ) tp 16/1	Shane Foley	59
05Jul12	<b>Leo</b> 12GS Hc 4K	8-13	<b>16/23</b> ( <u>21L Salam Alaykum 9-11</u> ) tp 20/1	Shane Foley	59
11Jun12	<b>Ros</b> 10Sft Hc 5K	9-1	<b>10/14</b> ( <u>11L Gra Geal Mo Chroi 8-6</u> ) t 12/1	Shane Foley	61
09Jun12	<b>Nav</b> 8Sft Hc 5K	8-6	<b>1/9</b> ( <u>shd Balladiene 9-0</u> ) t 6/1	Shane Foley	56
06Jun12	<b>Fai</b> 10Gd/Y Hc 3K	9-5	<b>9/18</b> ( <u>11L Xsquared 8-10</u> ) 14/1	Chris Hayes	56
10Feb12	<b>Dun</b> 12St Hc 3K	9-8	<b>10/12</b> ( <u>20L Indian Scout 8-12</u> ) 4/1	Joseph O'Brien	59
29Jan12	<b>Leo</b> 16Sft MdH 6K	11-10	<b>9/13</b> ( <u>26L Burn And Turn 11-5</u> ) 25/1	A E Lynch	—
27Jan12	<b>Dun</b> 10.5St Hc 3K	9-4	<b>2/12</b> ( <u>1¼L Shisha Threesixty 8-13</u> ) 8/1	Pat Smullen	55
26Dec11	<b>Leo</b> 16Y/Sft 4yMdH 6K	11-0	<b>9/16</b> ( <u>18½L Midnight Game 11-7</u> ) 66/1	David Splaine	—
05Nov11	<b>Dro</b> 16Sft MdH 8K	11-4	<b>10/13</b> ( <u>40L Benny's Fagartha 10-9</u> ) 10/1	Bryan Cooper	—
28Oct11	<b>Dun</b> 10.5St Hc 3K	9-5	<b>6/14</b> ( <u>10L Flavia Tatiana 9-3</u> ) 12/1	Pat Smullen	61
09Oct11	<b>Cur</b> 8Y/Sft Hc 5K	8-4	<b>6/18</b> ( <u>18½L Jills Ballet 9-2</u> ) 14/1	Kate O'Brien	63
05Oct11	<b>Nav</b> 10Sft Hc 5K	8-11	<b>18/22</b> ( <u>28L Tupelo Honey 9-4</u> ) p 9/1	Pat Smullen	63
05Apr11	<b>Lim</b> 8Sft Hc 5K	8-6	<b>2/15</b> ( <u>½L Maal 9-10</u> ) 4/1	Shane Foley	60
27Mar11	<b>Leo</b> 7Gd/Y Hc 5K	8-4	<b>5/14</b> ( <u>4½L West Coast Dream 8-9</u> ) 20/1	Chris Hayes	61
16May10	<b>Nav</b> 10GF 3yHc 5K	9-2	<b>10/12</b> ( <u>20L Lucky Forever 9-2</u> ) 16/1	S M McGuinness	69
03May10	<b>Cur</b> 7Y 7K	8-12	<b>10/30</b> ( <u>8¼L Cnocandancer 9-0</u> ) 50/1	S M McGuinness	—
25Apr10	<b>Nav</b> 10Gd 6K	9-0	<b>14/14</b> ( <u>62+L Rain Forest 9-0</u> ) 16/1	P Shanahan	—
17Apr10	<b>Naa</b> 8Gd 3y 6K	9-5	<b>10/16</b> ( <u>14½L Zayaan 9-5</u> ) 28/1	P Shanahan	—