

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

THE PREVALENCE OF CONGENITAL LIMB
DEFORMITIES IN A POPULATION OF NEW ZEALAND
STANDARD BRED FOALS AND THEIR INFLUENCE ON
RACING SUCCESS

*A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF SCIENCE AT MASSEY UNIVERSITY, PALMERSTON
NORTH, NEW ZEALAND*

NIKITA STOWERS

2013

ABSTRACT

This thesis reports on the retrospective studies carried out on two Standardbred studfarms in New Zealand that aimed to describe and investigate the prevalence of, and risk factors for, congenital limb deformities over the 2004/05 and 2005/06 breeding seasons.

A historical cohort study of 1,189 horses was used for describing the prevalence of limb deformities over two breeding seasons. Limb deformity data were routinely collected within one week of birth and foals were only scored once. Foals were described as either having a limb deformity or not. Risk factors investigated were sex, mare age, parity, farm, season, birth month and sire. Simple descriptive statistics were used to describe the prevalence of limb deformities, types of limb deformities and, treatments used. Univariable and multivariable logistic regression was used to investigate the risk factors for limb deformities. Within the multivariable model it was found that birth month, mare age, farm and season were all associated with the prevalence of limb deformities.

A subset of the historical cohort, consisting of all foals born in the 2005/06 season (n=627) was analysed to investigate the association between limb deformities and subsequent racing success. Univariable and multivariable logistic regression and linear regression were used to investigate the association between limb deformities, and racing success. Other variables including birth month, mare age, farm and sex and the association of these with racing success were also investigated. In the final multivariable model, birth month and sex were significantly associated with total starts of the racehorse at the completion of their 3-year-old season and birth month was significantly associated with total stakes.

ACKNOWLEDGEMENTS

I would like to thank all of those who gave me support throughout the time I was completing my Masters. First and foremost I would like to those in the industry that made this research possible, without whom, valuable industry research could neer take place. I would also like to thank my supervisors and colleagues for their support throughout the project and my family and friends for their unconditional support. It is my hope that industry research continues to be completed by those passionate about the racing and equine industries in New Zealand.

TABLE OF CONTENTS

Abstract	ii
Acknowledgements	iii
Table of Contents	iv
List of Figures	vi
List of Tables	vii
List of Abbreviations	viii
CHAPTER 2 – THE PREVALENCE OF CONGENITAL LIMB DEFORMITIES IN A POPULATION OF NEW ZEALAND STANDARDBREDS AND ASSOCIATED RISK FACTORS.....	26
Abstract	27
Introduction.....	28
Materials and Methods.....	29
Results.....	30
Discussion	33
Conclusions and Potential Relevance	35
References.....	36
CHAPTER 3 - THE INFLUENCE OF CONGENITAL LIMB DEFORMITIES ON RACING SUCCESS IN A POPULATION OF NEW ZEALAND STANDARDBRED FOALS	39
Abstract	40
Introduction.....	41
Materials and Methods.....	42
Results.....	43
Discussion	52
Conclusions and Potential Relevance	55

References.....56

CHAPTER 4 – GENERAL DISCUSSION, CONCLUSIONS AND FUTURE DIRECTIONS
.....59

General Discussion60

Conclusions and Future Directions60

LIST OF FIGURES

Figure 1.1: Schematic representation of the morphogenetic events in the formation of a synovial joint (McIlwraith and Trotter 1996).	5
Figure 1.2: The multifactorial nature of Developmental orthopaedic disease (DOD) (Blanchard 2005).	8
Figure 1.3: Carpus varus in a newborn foal	9
Figure 1.4: (a) Carpal Valgus in a newborn foal (b) Normal, carpal and fetlock valgus deformities.	10
Figure 1.5: Applying manual pressure to the medial aspect of the carpal region of a foal with bilateral valgus deformity, correcting the deformity temporarily (Auer 2006).	12
Figure 1.6: Correction of angular limb deformities using periosteal transaction to accelerate growth (Auer 2006).	13
Figure 1.7: Correction of angular limb deformities by transphyseal bridging (Auer 2006). ...	14
Figure 1.8: The application of splints for the correction of severe angular limb deformities (Auer 2006).	14
Figure 1.9: Contractural deformities in a new born foal.....	15
Figure 1.10: Hyperextension of the fetlock joint in a newborn foal	16
Figure 1.11: (a) A foal with severe contractural deformity (b) The application of splints to enable the foal to suckle (Santschi et al. 2006).	17
Figure 2.1: Proportion of horses with congenital limb deformities born in the 2005/06 and 2006/07 breeding seasons on farms 1 and 2.	31

LIST OF TABLES

Table 2.1: Proportion of limb deformities by type	30
Table 2.2: Descriptive statistics by farm.....	31
Table 2.3: Univariable logistic regression for outcome limb deformities	32
Table 2.4: Multivariable logistic regression model for limb deformities	33
Table 3.1: Univariable logistic regression of exposures on early milestones (Registered with a trainer, trialled, raced) of Standardbred racehorses born in the 2005/06 breeding season up to the completion of their 3-year-old racing season.....	45
Table 3.2: Univariable logistic regression of exposures on early milestones (Registered with a trainer by 2yo, trialled by 2yo, raced by 2yo) of Standardbred racehorses born in the 2005/06 breeding season up to the completion of their 3-year-old racing season.	47
Table 3.3: Final multivariable linear regression model of exposures on early milestones (Trialled, trialled by 2yo) of Standardbred racehorses born in the 2005/06 breeding season up to the completion of their 3-year-old racing season.....	49
Table 3.4: Univariable linear regression of exposures on ln(total starts) and ln(total stakes) of Standardbred racehorses born in the 2005/06 breeding season up to the completion of their 3-year-old racing season.....	50
Table 3.5: Final multivariable linear regression model for ln(total starts) and ln(total stakes) of ln(total starts) and ln(total stakes) of Standardbred racehorses born in the 2005/06 breeding season up to the completion of their 3-year-old racing season.....	52

LIST OF ABBREVIATIONS

DOD	Developmental orthopaedic disease
=	Equal to
>	Greater than
≥	Greater than or equal to
HRNZ	Harness Racing New Zealand
IQR	Interquartile range
<	Less than
LD	Limb deformity
Ln	Natural logarithm
NZ	New Zealand
95% CI	Ninety five percent confidence interval
OCD	Osteochondritis dissecans
%	Percent
Ref	Reference value
TH-MSD	Thyroid hyperplasia with concurrent musculoskeletal disease