



**UNIVERSITI PUTRA MALAYSIA**

***DISTRIBUTION OF COMPLETION AND ELIMINATION OF HORSES  
PARTICIPATING IN DIFFERENT DISTANCE OF ENDURANCE  
RACE, AND CAUSES OF ELIMINATION***

**MOHD AKMAL BIN MOHD NOOR**

**FPV 2015 45**

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AND CAUSES OF ELIMINATION**

**MOHD AKMAL BIN MOHD NOOR**

**A project paper submitted to the  
Faculty of Veterinary Medicine, Universiti Putra Malaysia  
In partial fulfilment of the requirement for the  
DEGREE OF DOCTOR OF VETERINARY MEDICINE  
Universiti Putra Malaysia  
Serdang, Selangor Darul Ehsan.**

**MARCH 2015**

It is hereby certified that we have read this project paper entitled “Distribution of Completion and Elimination of Horses Participating in Different Distance of Endurance Race, and Causes of Elimination”, by Mohd Akmal Bin Mohd Noor and in our opinion it is satisfactory in terms of scope, quality, and presentation as partial fulfilment of the requirement for the course VPD 4999 (Final Year Project).



ASSOCIATE PROFESSOR DATUK DR. BASHIR AHMAD FATEH MOHAMED  
DVM (UPM), MVSc (Melbourne), PhD (UPM),  
Department of Farm and Exotic Animal Medicine and Surgery  
Faculty of Veterinary Medicine  
Universiti Putra Malaysia  
(Supervisor)

## **DEDICATION**

### **TO ALL HORSE LOVER**

#### **FAMILY**

My father, Mohd Noor Bin Mohd Shariff.

My mother, Maziah Binti Mohd Yunus.

My brothers, Mohd Firdaus Bin Mohd Noor and Muhammad Izzat Bin Mohd Noor.

#### **FRIENDS**

My Final Year Project's Mate, Wafaa Abdul Washeff.

My best friends, Izdiyar Ishak, Faizal Hahlan, Deva Darshini Thinakaran, Nur

Diyana Mohd Tahir and Nurul Hafizah Abu Jazid.

## ACKNOWLEDGEMENTS

Alhamdulillah, I would like to express my deepest gratitude to my supervisor, Associate Professor Datuk Dr. Bashir Ahmad Fateh Mohamed, for his time, guidance, knowledge and constructive advices, comments and suggestions throughout this project.

I would also like to thank, Dr. Noraniza Mohd Adzahan and Dr. Nurul Hayah Khairuddin, from Department of Farm and Exotic Animal Medicine and Surgery, Universiti Putra Malaysia, for their support and guidance during data collection in Terangganu International Endurance Park (TIEP). Dr. Naguib Mohd Rais, Veterinary Officer from Large Animal Ward, University Veterinary Hospital, Faculty of Veterinary Medicine, Universiti Putra Malaysia for his effort during data collection. Also not to be forgotten, Professor Dr. Mohamed Ariff Omar, for his guidance and revision during data analysis.

I would like also to acknowledge my family for their support and time, and my friends who are involved directly and indirectly in the completion of this study.

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**LIST OF ABBREVIATIONS**

ADP	Adenosine Diphosphate
AMP	Adenosine Monophosphate
AST	Aspartate Transaminase
ATP	Adenosine Triphosphate
BCAA	Branched-Chain Amino Acid
bpm	Beats Per Minute
CK	Creatine Kinase
Cl <sup>-</sup>	Chloride
CRI	Cardiac Reflex Index
CRT	Capillary Refill Time
ECF	Extracellular Fluid
FEI	Fédération Equestre Internationale
GS	Gut Sound
GWB	Girth, Withers and Back
HR	Heart Rate
ICF	Intracellular Fluid
K <sup>+</sup>	Pottasium

MM	Mucous Membrane
MT	Muscle Tone
Na <sup>+</sup>	Sodium
NEFA	Non-Estrified Fatty Acid
ROS	Radical Oxygen Species
RTES	Royal Terangganu Endurance Stable
SR	Skin Recoil
TIEP	Terangganu International Endurance Park
XO	Xanthine Oxidase

## **ABSTRAK**

Abstrak kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk sebahagian daripada keperluan kursus VPD 4999 (Projek Ilmiah Tahun Akhir)

### **TABURAN KEBERJAYAAN DAN PEYINGKIRAN KUDA-KUDA YANG MENYERTAI PERLUMBAAN KUDA TAHAN LASAK DI DALAM JARAK YANG BERBEZA SERTA PUNCA-PUNCA PENYINGKIRANNYA**

**OLEH**

**Mohd Akmal bin Mohd Noor**

**2015**

**Penyelia: Profesor Madya Datuk Dr. Bashir Ahmad Fateh Mohamed**

Empat ratus lapan puluh lapan data perlumbaan kuda tahan lasak telah dikumpulkan daripada 61 ekor kuda semasa Piala Sultan Mizan 2014 di dalam jarak yang berlainan; 40 km (171 kuda); 80 km (215 kuda); 120 km (87 kuda) dan 160 km (15 kuda). Daripada 488 kuda, hanya 340 kuda (69.7%) yang berjaya menamatkan perlumbaan dan 148 kuda (30.3%) telah tersingkir daripada perlumbaan. Untuk perlumbaan 40 km, penyingkiran yang disebabkan oleh ketempangan dan peningkatan degupan jantung, masing-masing adalah 46.9%, sementara 6.2% disingkirkan atas sebab ketidaknormalan pergerakan usus. Bagi 80 km, punca penyingkiran yang disebabkan oleh ketempangan adalah 63.9%, diikuti dengan peningkatan denyutan jantung (31.9%) dan pergerakan usus yang abnormal (4.2%). Di dalam 120 km,

penyingkiran yang disebabkan oleh ketimpangan adalah 55.6%, peningkatan degupan jantung (38.9%), dan pergerakan usus abnormal (5.5%). Sementara, bagi 160 km; 100% penyingkiran adalah disebabkan oleh ketimpangan. Di dalam perlumbaan 40 km, penyingkiran yang disebabkan oleh gangguan metabolik adalah 53.1% dan muskuloskeletal 46.9%. Manakala bagi perlumbaan 80 dan 120 km, majoriti penyingkiran adalah muskuloskeletal dengan peratusan masing-masing adalah 63.9% dan 55.6%, diikuti gangguan metabolik; masing-masing 36.1% dan 44.4%. Akhir sekali, 160 km; 100% penyingkiran disebabkan oleh ketidaknormalan muskuloskeletal.

**Kata Kunci:** Perlumbaan Kuda Tahan Lasak, Keberjayaan, Penyingkiran, Gangguan Metabolik, Ketidaknormalan Muskuloskeletal, Factor-Faktor Risiko

## **ABSTRACT**

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfilment of the course VPD 4999 (Final Year Project)

### **DISTRIBUTION OF COMPLETION AND ELIMINATION OF HORSES PARTICIPATING IN DIFFERENT DISTANCE OF ENDURANCE RACE, AND CAUSES OF ELIMINATION**

**BY**

**Mohd Akmal bin Mohd Noor**

**2015**

**Supervisor: Associate Professor Datuk Dr. Bashir Ahmad Fateh Mohamed**

Four hundred and eighty eight endurance race data were collected from 61 horses during Sultan Mizan Cup 2014 in different distance; 40 km (171 horses); 80 km (215 horses); 120 km (87 horses); and 160 km (15 horses). Out of 488 horses, only 340 horses (69.7%) were able to complete the endurance race and 148 horses (30.3%) were eliminated. In 40 km race, elimination due to the lameness and elevated heart rate was 46.9% respectively, meanwhile 6.2% were eliminated due to abnormal intestinal motility. For 80 km race, the cause of elimination due to lameness is 63.9%, elevated heart rate; 31.9% and abnormal intestinal motility; 4.2%. In 120 km race, elimination due to lameness is 55.6%, elevated heart rate; 38.9% and abnormal intestinal motility; 5.5%. Meanwhile, for 160 km race; 100% elimination is due to

lameness. In 40 km race, elimination due to metabolic disorder is 53.1% and musculoskeletal; 46.9%. Meanwhile, in 80 and 120 km race, musculoskeletal elimination is 63.9% and 55.6% respectively, followed with metabolic disorder; 36.1% and 44.4% correspondingly. In 160 km race, all elimination is due to musculoskeletal abnormality.

**Keywords:** Endurance Race, Completion, Elimination, Metabolic Disorder, Musculoskeletal Abnormality, Risk Factors

## 1.0 Introduction

In recent 15-20 years, equine based sport varies in different part of the world and each country have their own sport related to the horse usage. The popularity of equine sport is not just developed locally in certain country but was established internationally with involvement of several official bodies to regulate and conduct the events (Nagy *et al.*, 2012). The sole international organization governing equine related sport is International Federation for Equestrian Sports or FEI (Fédération Equestre Internationale) based in Lausanne, Switzerland since 1921 (FEI, 2015).

Based on the FEI records, there are several officially approved international event in their long-year calendar such as Jumping, Dressage, Eventing, Driving, Vaulting, Reining and Endurance (FEI, 2015). There are specific rules and regulation for every single discipline that was recognized by the FEI as mentioned and the main issue emphasized by the FEI is animal welfare (Nagy *et al.*, 2012).

Therefore, the most common issue of elimination in those event is, whenever the welfare of the horse is compromised before, during or after the event was conducted (Nagy *et al.*, 2012). As a result, the main concern of the horse's welfare was discussed is relation to health aspects. This scope of study is normally focused on the metabolic and musculoskeletal disorder which must be assessed by the authorized veterinarian that were assigned by the governing body. Hence, veterinarian plays a major role in equestrian events (Lawan *et al.*, 2012c).



One of the equestrian sport that is fast gaining popularity worldwide is competitive endurance event (Nagy *et al.*, 2012). Endurance can be define as a sport that aims to test the competitor's ability to safely manage the stamina and fitness of the horse over an endurance course in a competition against the track, the distance, the climate, the terrain, and the clock (FEI, 2015). Another definition for endurance that it is a competition that was established to challenge the ability of the horses to race in particular distance according to the category that was listed by the organizer (Bergero *et al.*, 2005).

Since the endurance international event in Malaysia is governed by the FEI, the presence of veterinarian is mandatory before an endurance event was conducted. Before a horse is allowed to participate in any championship or tournament, the horse will be examined by the authorized veterinarian to ensure the welfare status of the horse is at optimum level without endangering factor as highlighted by the FEI (Lawan *et al.*, 2012b). Failure to complete each examination in every phase will be subjected to elimination and the most common elimination cause is metabolic or musculoskeletal ailment (Lawan *et al.*, 2014).

The objective of this study is to find the overall percentage of horses that are able to complete the competition, identify the elimination cause for each category in the competition and determine the type of elimination for different distance of race in the endurance competition.

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