



UNIVERSITI PUTRA MALAYSIA

***CONCENTRATION OF SERUM AMYLOID A IN CLINICALLY NORMAL
ENDURANCE HORSES IN MALAYSIA***

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**CONCENTRATION OF SERUM AMYLOID A IN CLINICALLY NORMAL
ENDURANCE HORSES IN MALAYSIA**

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In partial fulfilment of the requirement for the

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CERTIFICATION

It is hereby certified that we have read this project paper entitled “Concentration of Serum Amyloid A in Clinically Normal Endurance Horses in Malaysia”, by Sujey Kumar Rajendren and in our opinion it is satisfactory in term of scope, quality, and presentation as partial fulfilment of the requirement for the course VPD 4901 – Project.

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DEDICATION

Every challenging work needs self-efforts as well as guidance of elders especially those who
were very close to our heart.

My humble effort I dedicate to my loving

FATHER & MOTHER,

Whose affection, love, encouragement and prays of day and night make me able to finish my
task,

Along with all hard working and respected

SUPERVISORS

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ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4901 – Projek

**KEPEKATAN SERUM AMILOID A DI DALAM KUDA ENDURAN YANG
SIHAT DARI SEGI KLINIKAL DI MALAYSIA**

Oleh

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Kuda enduran yang menjalani latihan berat secara berterusan akan mengalami proses inflamasi disebabkan oleh tindakbalas fasa akut dengan pengeluaran protein fasa akut, iaitu serum amiloid A (SAA). Kajian ini dikendalikan untuk mengenalpasti kepekatan SAA dalam kuda enduran yang sihat dari segi klinikal yang direhatkan daripada perlumbaan enduran. Kepekataan SAA ditentukan melalui penilaian sampel *sera* daripada 40 kuda dari 3 kandang, secara *two-site enzyme linked immunoassay* (EIA).

Kepekatan tertinggi SAA diperhatikan dalam kuda yang direhatkan di antara 12 dan 24 bulan, manakala kuda yang direhatkan lebih daripada 24 bulan mempamerkan kepekatan SAA yang terendah. Semua kuda yang berumur di antara 6 dan 11 tahun mempunyai kepekatan SAA tinggi. Apabila selang berehat dibandingkan dengan jantina, ia menunjukkan bahawa semua kuda betina mempunyai kepekatan SAA tinggi berbanding *gelding* dan *stallion*. Kuda yang direhatkan di antara 12 dan 24 bulan boleh dipertimbangkan cenderung untuk mendapat kecederaan kerana mungkin ada pengurangan kecergasan dalam kuda-kuda ini. Kepekatan SAA dalam kuda direhatkan lebih daripada 24 bulan adalah yang paling

mungkin rendah disebabkan oleh kuda telah pulih dengan baik dari kecederaan yang mungkin dialami semasa perlumbaan sebelumnya. Kepekatan SAA kuda *Thoroughbred* adalah lebih tinggi berbanding dengan kuda *Arabian* pada setiap jangka masa rehat

Kepekatan SAA yang disarankan sebagai rujukan untuk kuda enduran di Malaysia ialah antara 2.09 dan 8.09 mg/l. Kepekatan SAA dalam kuda enduran di negara lain di jangka lebih rendah kerana cuaca di Malaysia yang agak panas dan laluan enduran lebih mencabar.

Kata kunci: Serum amiloid A, kuda enduran, latihan berat, umur, jangka masa rehat.



ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in
partial fulfilment of the course VPD 4901 - Project

CONCENTRATION OF SERUM AMYLOID A IN CLINICALLY NORMAL ENDURANCE HORSEs IN MALAYSIA

by

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Endurance horses which undergo continuous strenuous training may experience injuries giving rise to inflammation which leads to an acute phase reaction with the production of acute phase protein, namely serum amyloid A (SAA). This study was conducted to establish the concentration of SAA in clinically normal endurance horses while they were rested from endurance racing. The concentration of SAA was ascertained *via* sampled sera from 40 individuals at three stables, using a two-site enzyme linked immunoassay (EIA) test.

The highest concentration of SAA was observed in horses rested between 12 and 24 months, while horses that were rested more than 24 months expressed the lowest concentration of SAA. All horses between the ages of 6 and 11 years old had high SAA concentration. When resting intervals were compared against gender, it showed that all mares had high SAA concentration compared to geldings and stallions. Horses that were rested between 12 and 24

months may be considered prone to injuries as there may be a reduction in fitness in these horses. The SAA concentration in horses rested more than 24 months was low most probably due to the horses having recovered well from possible injuries sustained during an endurance race. SAA concentration of Thoroughbred horses were comparatively higher than Arabian horses at all rest intervals

The recommended SAA reference range for the endurance horses in Malaysia is between 2.09 mg/l and 8.09 mg/l. As the endurance terrain and weather are tough in Malaysia, it is expected that the SAA concentration in endurance horses in Malaysia may be higher than other places.

Keyword: Serum Amyloid A, endurance horse, strenuous training, age, rest interval

1.0 INTRODUCTION

Endurance riding is a competition to test the rider's ability to safely manage the stamina and fitness of his horse over an endurance course in a race against the track, distance, climate, terrain and time. It was first developed in the early 1900s as a military test for cavalry mounts, where horses were required to go up to 300 miles ride while carrying 200lbs for five days. The oldest organised long distance endurance competition was probably the Vienna-Berlin ride in 1892 (Nagy *et al.*, 2012). The cavalry test became a civilian sport in the early 1950s.

The first modern endurance ride held in 1955 was a one day, 100 miles race from Lake Tahoe, California to Auburn California. On the original course, the fastest winning speed was 15 km/hour (Nagy *et al.*, 2012). Australia holds the second oldest tradition of modern endurance competition, having run the 160 km Tom Quilty Gold Cup since 1966. Spain and Portugal have held endurance rides since the 1950s.

The European Long Distance Rides Conference (ELDRIC) was formed in 1979 and it played an important role in integrating North American, Australian and South African guidelines, and organising international competitions. Endurance became a Fédération Equestre Internationale (FEI) discipline in 1982, and since then international rides have been conducted under FEI regulations (Nagy *et al.*, 2012). The basic rule for endurance riding is the first horse to finish in acceptable condition, is the winner and there is no minimum amount of time allowed for the race, giving horse and rider an opportunity to set a quick pace. The horses are supervised by veterinarians at each vet gate.

Endurance horses have a physical look which could be described as small and without excessive muscling. Typical body weight measurements would be in the range of 850 to 1050 pounds. This type of body is advantageous both for reducing thermal load and for travelling up and down mountains (Duren & Duren, 1955).

An endurance horse ridden at a medium trot (250 meter/min) could potentially complete a 25-mile endurance course in about 3 hours, a 50-mile endurance course in just over 5 hours and a 100-mile course in approximately 11 hours (Duren & Duren, 1955). Given these estimates for “competition time,” a tremendous chance exists for occurrence of inflammation on the musculoskeletal system. Monitoring the inflammatory response is a clinical challenge, because the classical galenic clinical signs of *dolor*, *rubor*, *calor*, *tumor* and *functio laesea* are not always clinically manifested (Jacobsen *et al.*, 2007). Recognising inflammation in a horse with a purulent wound usually requires nothing more than a clinical assessment, but in horses that do not display obvious clinical signs yet remain ill, blood-biochemical and/or haematological testing may be necessary in order to identify inflammatory disease.

The search for blood parameter to define the presence of inflammation has therefore been intensive for many decades. Recently, interest has focused on the acute phase proteins (APPs) as indicators of inflammation. APPs can be separated into positive APPs which increases in the presence of inflammatory triggers, and negative APPs which decreases in acute phase state (Pepys *et al.*, 1983). Positive APPs can be further divided into major APPs which increases either 10, 100 or even 1000 times fold in the presence of inflammatory triggers, and minor APPs which increases very little (Pepys *et al.*, 1983). Among positive APPs, serum amyloid A (SAA) is one and only identified major APP in horses (Mozes *et al.*, 1989).

SAA is synthesised in the liver and its production decreases immediately after the synthesis stops or after recovery (Uhlir *et al.*, 1999). It has low basal values with a narrow reference range (Kent, 1992). It quickly increases 10 to 1000 times its normal concentration in response to infection or inflammatory conditions, and decreases quickly in response to treatment. However it remains high if there is no recovery (Kent, 1992).

Since endurance horses continuously undergoing vigorous training in hot and humid Malaysian weather, the aim of this study is to determine the effect of resting interval on

concentration of serum amyloid A, and to arrive with the reference range value of this protein in clinically normal endurance horses in Malaysia.



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