

4th

Proceedings
of the Seminar

on

VETERINARY
SCIENCES

4th
Proceedings
of the Seminar
on
VETERINARY
SCIENCES
Faculty of Veterinary Medicine UPM
5 - 8 January 2009

RASEDEE ABDULLAH • ABDUL RAHIM MUTALIB
ABDUL RANI BAHAMAN • KALTHUM HASHIM



Faculty of Veterinary Medicine
Serdang • 2009

© Faculty of Veterinary Medicine
Universiti Putra Malaysia 2009

All rights reserved. No part of this book may be reproduced in any form without permission in writing from the publisher, except by a reviewer who wishes to quote brief passages in a review written for inclusion in a magazine or newspaper.

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Seminar on Veterinary Sciences (4th: 2009: Selangor)
4th proceedings of the Seminar on Veterinary Sciences, Faculty of
Veterinary Medicine UPM, 5-8 January 2009/ Rasedee Abdullah ...
(et al.).
ISBN 978-967-344-081-8
1. Veterinary medicine--Congresses. 2. Animal--Diseases--Congresses.
3. Livestock--Diseases--Congresses. I. Rasedee Abdullah. II. Title.
636.089

Font: Times New Roman
Text font size : 10/13.2

Typeset and Printed by
Universiti Putra Malaysia Press
43400 UPM Serdang
Selangor Darul Ehsan
Tel:03-89468851/89468854
Fax: 03-89416172
Emel: penerbit@putra.upm.edu.my

Content

Preface

1. A Preliminary Study of Common Abnormalities Related to Musculoskeletal, Respiratory and Cardiovascular Systems in Non-Performing Racehorses 1
Shanthiravathanan Mariemuthu, Tengku Azmi Tengku Ibrahim, Goh Yong Meng & Shri Kanth
2. Comparison of Blood Parameters in Horses in Different Types of Exercises 7
Mok Hsiao Li, Noraniza Mohd. Adzahan, Bashir Ahmad, Rasedee Abdullah & Mohd Ariff Omar
3. Microbiological Quality of Raw Rabbit Meat 12
Sylmie Al-Harir, Latiffah Hassan & Saleha Abdul Aziz
4. Conditions Associated with Long Distance Endurance Race in Horses 16
Nurul Hudah Sulimai, Bashir Ahmad & Noraniza Mohd Adzahan
5. Effect of Medium-Chain Triacylglycerols on Piglets in Farms in Sepang, Malaysia 20
Yong Chiun Khang, Engku Azahan Engku Ahmed, Ooi Peck Toung & Fong Chee Wee
6. Seroprevalence of Common Viral Infections in the Red Junglefowl 27
(Gallus gallus spadiceus)
Syamsiah Abdul Ghani, Siti Suri Arshad & Shaik Mohamed Amin Babjee
7. External Abnormalities and Microbiological Evaluation of Cutaneous Lesions in Two Endangered chelonians, *Batagur baska* and *Callagur borneoensis* in Captivity 28
Chong Shu Chuin, Reuben Sharma, Abdul Rani Bahaman & Vellayan Subramaniam
8. Anticancer Effects of Tamoxifen, Doxorubicin and RhuEPO-doxorubicin 29
Combination on Canine Mammary Tumour Cells
Low Soon Siok, Rasedee Abdullah & Teo Guan Young
9. Histological and Quantitative Assessment of the Syrinx of Malayan Peacock-pheasant (*Polyplectron malacense*), Hill Mynah (*Gracula religiosa*) and Green-winged Pigeon (*Chalcophaps indica*) 30
Mohd Hafidz Mohd Izhar, Shanthy Ganabadi & Jalila Abu

10. Prevalence of <i>Mycoplasma synoviae</i> in Commercial Poultry Farms in Malaysia <i>Chuah Ling Ling & Aini Ideris</i>	31
11. Validation of FAMACHA© for Diagnosis of Haemonchosis in Goats <i>Ong Tze Chein & Rehana Abdullah Sani</i>	32
12. Enhancement of Doxorubicin and Doxorubicin-rHuEPO Combination Treatments of Canine Mammary Gland Tumor by Peripheral Blood Mononuclear Cells <i>Tan Zhang Jian, Rasedee Abdullah & Teo Guan Young</i>	33
13. Povidone-Iodine and Tincture-Iodine as Topical Antiseptic for Final Skin Preparation Prior to Abdominal Surgery in Small Animals <i>Nor Emeliawati Mohamed Napiah, Rashid Ibrahim & Zunita Zakaria</i>	34
14. Prevalence of Caseous Lymphadenitis in Goats Reared by Small Holder Farmers and Antibiotic Sensitivity of <i>Corynebacterium pseudotuberculosis</i> <i>Zubaidah Kamarudin, Abd Aziz Saharee & Siti Khairani Bejo</i>	35
15. Seroprevalence and Control of Haemorrhagic Septicaemia in Cattle in Endemic and Nonendemic States <i>Wan A'aidah Wan Hashim & Abd Aziz Saharee</i>	36
16. Comparison of Urine Protein-to-Creatinine Ratio Measured by Dry and Wet Biochemistry Methods <i>Grace Leong Huey Mey, Hazilawati Hamzah, Goh Yong Meng, Mohd Rosly Shaari & Jasni Sabri</i>	37
17. Feeding of Metabolites Produced from Lactic Acid Bacteria to Replace Antibiotics in Broiler Chickens <i>Ong Shu, Kai, Mohamed Ali Rajion & Loh Teck Chwen</i>	38
18. Comparison of Growth and Proximate Composition of <i>Microalgae chaetoceros</i> Sp. and <i>Nannochloropsis</i> Sp. Grown under Natural and Controlled Condition <i>Hew Wei Ee, Mohamed Shariff Mohamed Din & Sanjoy Banerjee</i>	39
19. Serological Prevalence of Leptospiral Infection in Dogs from Dewan Bandaraya Kuala Lumpur and Selected Private Clinics in Malaysia <i>Tan Wee Kwan & Abdul Rani Bahaman</i>	40
20. Modulation of Peripheral Blood Mononuclear Cells by Recombinant Human Erythropoietin to Combat Canine Mammary Gland Tumors <i>Wong Wee Kuan, Rasedee Abdullah & Teo Guan Young</i>	41

21. Detection of <i>Ehrlichia canis</i> Infection via PCR in Dogs from Malaysia <i>Lim Sue Yee, Malaika Watanabe & Goh Yong Meng</i>	42
22. Prevalence of <i>Rhodococcus equi</i> in the National Stud Farm <i>Liu Shwu Yunn, Zunita Zakaria & Abdul Rahim Mutalib</i>	43
23. Propagation of Newcastle Disease Virus in Various Cell Lines <i>Mohd Firdaus Ariff Abdul Razak, Aini Ideris & Tan Sheau Wei</i>	44
24. Serological and Bacteriological Prevalence of Leptospiral Infection in Rats in Universiti Putra Malaysia Serdang Campus <i>Ismida Hanis Md Harun, Abdul Rani Bahaman & Siti Khairani Bejo</i>	45
25. Caprine Mastitis and Antibiotic Resistant Patterns in Smallholder Goat Farms <i>Ainul Shazreen Abdul Aziz, Siti Khairani Bejo & M. Murugaiyah</i>	46
26. Bovine Mastitis and Antibiotic Resistance in Smallholder Dairy Farms in Malaysia <i>Noor Ismaliza Ismail, Siti Khairani Bejo & M. Murugaiyah</i>	47
27. Electroencephalogram, Blood Oxygen Saturation and Electrocardiogram Changes Associated with Temporary Carotid Artery Compression in Anesthetized Goats <i>Au Lai Yin, Goh Yong Meng & Chen Hui Chen</i>	48
28. Cyclical Variation of Blood Parameters in Healthy Goats under Tropical Condition <i>Foo Chen Yin, Goh Yong Meng & Rasedee Abdullah</i>	49
29. Screening Bacteria for Potential Probiotics from Wild Boars <i>Fong Vin-xen, Ooi Peck Toung, Tan Do Yew & Zainal Zahari Zainuddin</i>	50
30. A Preliminary Study of Haematology and Serum Biochemistry of Captive Malayan Porcupine (<i>Hystrix brachyura</i>) <i>Ahmad Fikri Ahmad Yunus, Abdul Wahid Haron, Hazilawati Hamzah & Zainal Zahari Zainuddin</i>	51
31. Prevalence of Canine Hip Dysplasia and Grading of Cases Seen at the University Veterinary Hospital, Universiti Putra Malaysia <i>Noor Zulfa Shamsuddin & Rashid Ibrahim</i>	52
32. Ginger (<i>Zingiber officinale</i>) Extract as an Alternative Anthelmintic against <i>Haemonchus contortus</i> in Goats <i>Siti Norsyakirah Hashim, Arifah Abdul Kadir, Rehana Abdullah Sani & M. Murugaiyah</i>	53

33. Diagnostic Significance of Toxic Neutrophils in Blood Smears of Cats: a Retrospective Study <i>Balqis Abdul Halim, Hazilawati Hamzah, Habibah Arshad & Latiffah Hassan</i>	54
34. Comparative Evaluation of Muscle Fibre Types between the Red Junglefowl (<i>Gallus gallus spadiceus</i>), Malaysian Indigenous Chicken (<i>Gallus gallus domesticus</i>) and Commercial Broiler Chickens <i>Shazlina Dolah, Md Zuki Abu Bakar & Lokman Hakim Idris</i>	55
35. Preliminary Study of Common Viral, Bacterial and Parasitic Status of Wild Boar in Selangor, Malaysia <i>Ngo Su Ping, Ooi Peck Toung, Tan Do Yew & Zainal Zahari Zainuddin</i>	56
36. Histological Evaluation on Osteogenesis of Tubular and Chipped Avian Demineralized Bone Matrix in Pigeons <i>Pang Le Ling, Jalila Abu & Tengku Azmi Tengku Ibrahim</i>	57
37. Investigation and Description of a Latero-flank Approach to Ovariectomy for Puppies, Kittens, Adult Dogs and Cats <i>Koh Karen, Nadzariah Cheng Abdullah, Gurmeet Kaur Dhaliwal & Lim Suit Fun</i>	58
38. Infectivity of Infectious Laryngotracheitis Virus Isolate of Malaysia in Specific Pathogen Free Embryonated Chicken Eggs <i>Natrah Abd. Razak & Mohd Hair Bejo</i>	59
39. Microscopic Evaluation of Breast and Thigh Muscles of the Red Junglefowl (<i>Gallus gallus spadiceus</i>), Malaysian Indigenous (<i>Gallus gallus domesticus</i>) and Broiler Chickens <i>Siti Mariam Zainal Ariffin, Md Zuki bin Abu Bakar & Lokman Hamik Idris</i>	60
40. Molting Patterns of Captive African and Rockhopper Penguins at the Underwater World Langkawi <i>Norhana Mohamad Nadzir, Jalila Abu & Latiffah Hassan</i>	61
41. Effect of Common Chemotherapeutants on Goldfish (<i>Carassius auratus</i>) and Guppy (<i>Poecilia reticulata</i>) and Their Effectiveness in Controlling External Pathogens <i>Siti Nurkhadijah Md Yunos & Hassan Hj Mohd Daud</i>	62
42. Bacterial Flora of the Cervico-vaginal Mucus of Cows <i>Irni Jasia Ibrahim, Rosnina Yusoff & Zunita Zakaria</i>	63

43. Antibiotic Resistant *Campylobacter* spp., *Arcobacter* spp. and *Salmonella* spp. 64
in Blood Cockles (*Anadara granosa*) and Carpet Clams (*Paphia undulata*)
from Markets in Kuala Lumpur and Selangor, Malaysia
Wong Shy Jye & Saleha Abdul Aziz
44. Determination of LD₅₀ in Genetically-Improved Farm Tilapia 65
(*Oreochromis* spp.) against *Streptococcus agalactiae*
Liaw Shu Lan, Md Sabri Mohd Yusof, & Siti Zahrah Abdullah
45. *In Vitro* Study of Ginger (*Zingiber officinale*) as Alternative Anthelmintic 66
against *Haemonchus contortus* L3 Stage
Amir Husin Abd Rani, Arifah Abdul Kadir, Rehana Abdullah Sani
& *M. Murugaiyah*
46. Microbiological Quality of Frog Meat 67
Ummi Noorhakimah Abdullah, Latiffah Hassan & Saleha Abdul Aziz
47. Analgesic Effect of Tramadol and Tolfenamic Acid in 68
Post-ovariohysterectomized Cats
Tan Yian Ming, Chen Hui Cheng & Nor-Alimah Rahman
48. Effect of Selenium Supplementation on the Spermatogenic Cells of Goats 69
Amelia Choong Khai Lin, Shanthi Ganabadi, Mohamad Hilmi Abdullah
and Halimatun Yaakub
49. Comparison between Automated and Manual Differential WBC Counts of 70
Canine Blood at different Storage Times
Ong Hoi San, Nadzariah Cheng Abdullah, Hazilawati Hamzah
& *Noordin Mohamed Mustapha*
50. Methicillin Resistant *Staphylococcus aureus* in Raw Chicken Meat 71
in the Klang Valley, Malaysia
Mohammad Fhitri Shari & Zunita Zakaria
51. Occurrence of Bacteria in Fresh and Frozen Semen of Bulls 72
Norsharina Arshat, Rosnina Yusoff & Saleha Abdul Aziz
52. Gross and Histological Changes of Specific Pathogen Free Embryonated 73
Chicken Eggs Infected with Avian Reovirus via Different Routes of Inoculation
Nik Mohd Faiz Mohd Azmi & Mohd Hair Bejo
53. Prevalence and Diagnosis of Blood Parasites in Dogs in the Klang Valley, 74
Malaysia
Gerry Yeoh Wen Han, Rehana Abdullah Sani, Hazilawati Hamzah &
Yeoh Eng Cheong

54. Effects of Road Transportation on Physiological Stress Responses and Heat Shock Protein 70 Expression in Boer Goats <i>Cheah Yuen Wai, Mohamed Ali Rajion, Zulkifli Idrus & Goh Yong Meng</i>	75
55. Physiological and Behavioural Responses to Road Transportation and Translocation in the Red Junglefowl (<i>Gallus gallus spadiceus</i>) and Commercial Broiler Chickens <i>Azalea Hani Othman, Shaik Mohamed Amin Babjee & Zulkifli Idrus</i>	76
56. Isolation, Propagation and Infectivity of Fowl Adenovirus of Malaysian Isolate in Specific Pathogen Free Embryonated Chicken Eggs <i>Mohd Faizal Ghazali & Mohd Hair Bejo</i>	77
57. Occurrence of Antibiotic Resistant <i>Escherichia coli</i> and <i>Salmonella</i> Spp. in Dogs and Cats <i>Loke Yuen Ang & Saleha Abdul Aziz</i>	78
58. Changes in Blood Parameters of Endurance Horses with Metabolic Crisis <i>Muhammad Munsiff Kamarudin, Bashir Ahmad, Noraniza Mohd Adzahan & Rasedee Abdullah</i>	79
59. <i>In Vitro</i> Anthelmintic Efficacy of Bitter Gourd (<i>Momordica charantia</i>) Whole Fruit Extract Against <i>Haemonchus contortus</i> Infective Stage Larvae <i>R. Pravina Vathi & M. Murugaiyah</i>	80
60. Efficacy of Lactic Acid Bacteria as Probiotics in <i>Clarias</i> Sp. <i>Dian Najibah Abu Talib & Hassan Hj. Mohd Daud</i>	81
61. Morphological Features of the Red Jungle Fowl (<i>Gallus Gallus spadiceus</i>) and its Domestic Crosses <i>Salehatul Khuzaimah Mohamad Ali, Shaik Mohamed Amin Babjee & Halimatun Yaakob</i>	82
62. A Retrospective Study on the Injuries of the Superficial Digital Flexor Tendon in Thoroughbred Racehorses <i>Dasarathurao Seeta Ramaiah, Noraniza Mohd Adzahan, Goh Yong Meng & Shri Kanth</i>	83

Preface

The abstracts in this proceedings are the results of research conducted by the final year Doctor of Veterinary Medicine Students of the Faculty of Veterinary Medicine, Universiti Putra Malaysia. All research conducted were under strict supervision of academic staffs of the Faculty. Inevitably most of the studies are part of the on-going research conducted by the academic members of the Faculty. The findings from these studies were often publishable in cited journals. Since it is the requirement that any paper published in journal should not be published elsewhere, many of the studies presented in this proceedings are just short abstracts rather than extended abstracts. This will allow the researchers to publish their findings elsewhere without compromising the originality of the articles.

One the main functions of this proceedings is to serve as a reference for students, lecturers and other interested parties on the research activities conducted in Faculty. The final year students usually use the information in the proceedings to design their projects, the conduct of which is a partial requirement for graduation. The information in the proceedings is extremely useful for these students; particularly when organized scientific research is a new activity for them. Finally, this publication is distributed to the graduating students as a souvenir.

The editorial board wishes to take this opportunity to congratulate the students and their supervisors for jobs well done. We are sure the experience gained from these independent researches will be cherished and would surely make them better veterinarians. We thank the Faculty of Veterinary Medicine for facilitating the publication of this proceedings.

The Editors

Rasedee Abdullah
Abdul Rahim Mutalib
Abdul Rani Bahaman
Kalthum Hashim

A Preliminary Study of Common Abnormalities Related to Musculoskeletal, Respiratory and Cardiovascular Systems in Poor-Performing Racehorses

**Shanthiravathanan Mariemuthu, ¹Tengku Azmi Tengku Ibrahim,
¹Goh Yong Meng & ²Shri Kanth**

*¹Department of Veterinary Preclinical Sciences,
Faculty of Veterinary Medicine, University Putra Malaysia*

²Selangor Turf Club, Malaysia

Abstract

This study was undertaken to determine the presence of common musculoskeletal, respiratory and cardiovascular abnormalities in nonperforming racehorses. A preliminary clinical sports medicine evaluation was applied to 25 Thoroughbred racehorses with a history of poor racing performance. Recent racing history was used to determine horses with a history of poor performance and horses with a winning percentage of 0 to 10%. These horses were admitted into the study. The poor performance evaluation included a general physical examination, treadmill exercise and an immediate post-exercise assessment, which included cardiac auscultation and cardiac recovery index (CRI) assessment, lameness evaluation, and endoscopy study of the respiratory tract. The diagnostic methodologies utilized were tailored for the determination of common musculoskeletal, respiratory and cardiovascular abnormalities contributing to inadequate performance in the racing thoroughbreds. Eighty-eight percent of the sampled population in the present study showed existence of abnormalities associated with the musculoskeletal, respiratory and cardiovascular systems. At the same time, 24% of the horses showed abnormalities in more than one of the investigated system. Winning probability was to some extent found to be related to the CRI of the racehorses. In summary, the study indicated that abnormalities related to the musculoskeletal, respiratory, and cardiovascular systems were present in considerable number in poor-performing racing thoroughbreds.

Keywords: racehorses, poor performance, treadmill exercise, cardiac recovery index (CRI), endoscope.

Introduction

Horses are often considered to be the premier athlete amongst mammals. In this respect considerable time, effort, and money are invested in the preparation of horses for various athletic events. Regardless of discipline, expectation was always that a well-trained and properly schooled horse will be competitive. Failure of a horse to perform up to expectations results in frustration and gives rise to questions about the cause of its poor performance. For competing racehorses, a complete official performance record could indicate whether an individual's performance has always been as expected, or there has been a recent reduction in its performance. These changes may manifest in the musculoskeletal, respiratory and cardiovascular systems as these three major systems are often suspected to be closely associated with the athletic performance of horses (Patteson, 1996). Developmental and anatomical abnormalities of these systems may greatly impair the ability to maintain performance level and seriously jeopardize their abilities and their long-term health.

This preliminary study was conducted to determine the presence of common musculoskeletal, respiratory and cardiovascular abnormalities in non-performing racehorses in Malaysia.

Materials and Methods

Study Sample

The study was undertaken with the kind permission of the Selangor Turf Club, Sungai Besi. Initially, recent official records on racing performance involving the number of races and the number of wins was obtained. Twenty-six-horoughbreds from general population of class 5 race horses which carry a winning percentage of 0 - 10% were selected for the study. They comprised of 21 geldings and 5 mares aged between 3 and 8 years old and were selected from the same trainer from the turf club. All horses were trained for the Malaysian flat racing and were still actively involved in work. However, one horse has to be excluded from the study as it developed injury during the treadmill exercise.

Physical Examination

Resting cardiac and upper and lower respiratory examination, which involved heart and chest auscultation, were carried out to identify the presence of any overt abnormalities in these systems. Lameness evaluation using a standardized American Association of Equine Practitioners (AAEP) lameness grading system was also carried out prior to exercise testing.

Exercise Test

Following a complete physical evaluation, the horses were subjected to a standard exercise protocol to detect abnormalities which variably manifested during medium and high speed exercise or after an intense exercise. The standard treadmill exercise consisted of 5 phases which are; Phase 1 - Warm up with a walk, 7.2km/h for 4 min, Phase 2 - A trot up to 16.2km/h for 1 min, Phase 3 - Canter with 25.2km/h for 2 min, Phase 4 - Deceleration to a trot with 16.2km/h for 1 min, and Phase 5 - Walk, 7.2km/h for 4 min. During exercise the treadmill was elevated to 4° to help increase the exercise intensity. The treadmill exercise protocol was a modification of an established "Incremental Step Test" (Parente, 2005).

Immediate Post-exercise Assessment

Immediately following treadmill exercise, the heart rate of the horse was recorded. The presence of dysarrhythmias, murmurs or other abnormal heart sounds were noted, along with possible evidence of primary and secondary pulmonary dysfunction through chest auscultation. Heart rate was taken at 0 min immediately post-exercise. The horse was then slowly led and corresponding heart rate was taken at 1 min and 3 min post-exercise and again after a trot-up of 80 m to assess cardiac recover index (CRI) after the exercise. During the trot-up session, lameness evaluation using the AAEP lameness grading system was also carried out to evaluate the presence of any musculoskeletal abnormalities. Subsequently, the horse was subjected to upper and lower airway endoscopy for the presence and evaluations of upper and lower respiratory tract disorders.

Statistical Analysis

Data obtained were tabulated for percentage of animals having musculoskeletal, respiratory and cardiovascular abnormalities. Correlation between CRI, winning percentage and number of wins were performed using the Spearman's rank correlation. CRI and winning percentage of the experimental subjects were compared across presence or absence of lameness, endoscopic abnormalities and

auscultation abnormalities using the Mann-Whitney U test (a non-parametric equivalent of independent T-test).

Results

Musculoskeletal, Respiratory and Cardiovascular Problems

Twenty-two horses or 88% of the sampled population showed the presence of abnormalities associated with the above mentioned systems (Tables 1 and 2).

Table 1: System associated with abnormalities in horses

System involved	Horses with abnormalities
	Number (%)
Musculoskeletal	7 (28)
Respiratory	10 (40)
Cardiovascular	5 (20)

Table 2: Type of abnormalities diagnosed and number of horses affected

System	Abnormalities	
	Type	Number (%)
Musculoskeletal	Lame Right Front Limb	4 (16)
	Lame Left Front Limb	0 (0)
	Lame Right Hind Limb	2 (8)
	Lame Left Hind Limb	1 (4)
Respiratory	Laryngeal Hemiplegia	5 (20)
	Dorsal Displacement of Soft Palate	2 (8)
	Arytenoid Chondritis	2 (8)
	Mucus in airway	1 (4)
Cardiovascular	Murmur	5 (20)

Cardiac Recovery Index

The CRI varied from 0 to 28 in the horses sampled and 20 horses showed CRIs of between 0 to 4 post-exercise.

Correlation between Cardiac Recovery Index, Winning Percentage and Wins

The CRI and winning percentage were found to be inversely related ($\rho = -0.510$ and $p = 0.09$) and there was presence of moderate correlation ($\rho = -0.403$ and a $p = 0.046$) between CRI and number of wins (Table 3).

Table 3: Correlation between cardiac recovery index, winning percentage and number of wins

		CRI	Percentage	Win
CRI	Correlation Coefficient	1.000	0.510**	0.403*
	Sig. (2-tailed)		0.009	0.046
	N	25	25	25
Percentage	Correlation Coefficient	0.510**	1.000	0.940**
	Sig. (2-tailed)	0.009		0.000
	N	25	25	25
Win	Correlation Coefficient	0.403*	0.940**	1.000
	Sig. (2-tailed)	0.046	0.000	
	N	25	25	25
Spearman's rho				

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Discussion

In the present study it was found that musculoskeletal, respiratory and cardiovascular systems related abnormalities were present in a number of poor performing thoroughbreds. Sixty percent of the horses sampled showed the existence of abnormality related to either of the above mentioned systems. Percentage of respiratory system abnormalities was higher compared to musculoskeletal and cardiovascular systems. Forty percent samples showed the presence of respiratory system abnormality after exercise which concurred with two previous reports (Morris and Seeherman, 1991; Martin *et al.*, 1999), which signify that the horses examined for poor performance had some form of upper airway obstruction during exercise.

Four horses were diagnosed with grade 3 laryngeal hemiplegia while one horse was diagnosed with grade 4 laryngeal hemiplegia representing 20% of total horses sampled. This finding correlated with that of Ferrucci (2003) who reported similar percentage of occurrence of laryngeal hemiplegia in his treadmill endoscopic study on poor performing horses. A limitation in the interpretation of these studies was that the horses were studied at submaximal exercise level on treadmill resulting in air flow rates not as high as that which occurred in horses exercised at racing speeds. This may lead to inability of the treadmill exercise to truly exacerbate the airway abnormalities in the horses examined. Thus, experimental procedures using high-speed treadmill exercise that may verge on racing speeds may be an extra valuable tool for a definite diagnosis pertaining to this condition particularly, and the upper respiratory tract disorders generally.

A study by Lane *et al.* (2006) during high-speed treadmill endoscopy of 600 Thoroughbred race horses showed that Dorsal Displacement of the Soft Palate (DDSP) was the disorder most frequently identified as 50% of the sampled horses showed the presence of DDSP. However, in this study, only two horses (8%) from the total number of horses sampled showed the presence of DDSP during post-exercise endoscopic evaluation. As explained by Parente (2005), DDSP is an upper respiratory tract abnormality which is not always reproduced during dynamic endoscopy in clinically affected horses. Thus, the lower percentage of horses diagnosed with DDSP in the present study may be due to the condition not reproduced during dynamic endoscopic evaluation of the airway.

One horse was found to have mucus in the airways with a score of 3 of 5. A study by Holcombe (2004) showed that, a mucus score of 2-5 was associated with poor performance compared with horses with a mucus score of 0 or 1 which suggests that moderate to severe tracheal mucus accumulation is a risk factor in poor racing performance horses.

The presence of mild to moderate lameness, which commonly goes unnoticed, can contribute to poor performance, perhaps by decreasing the efficiency of movement or even by altering the horse's attitude toward exercise and the ability to achieve the level of fitness required to compete successfully. Dabareiner (2005) indicated that 39% of horses examined for poor performance showed signs of lameness signifying the presence of musculoskeletal abnormalities. In this study, 28% of the horses examined showed existence of lameness. Lameness in these horses could indicate the presence of ongoing pathology in the musculoskeletal system which could include degenerative joint diseases (osteoarthritis), navicular syndrome and tying up syndrome (recurrent exertional rhabdomyolysis). These injuries are most often reported in non-performing race horses.

Cardiac disease represents the third most important cause of loss of performance in horses. In the present study, murmurs were detected in five of the horses of ages ranging from 3 to 8 years, which could indicate the presence of grade 3 systolic murmurs during auscultation. Murmurs associated with the valves between the atria and the ventricles could result in poor performance, especially if they occur on the left side of the heart (mitral valve) which could result in heart enlargement, atrial fibrillation, and ventricular arrhythmias (Jose, 2006). However, it is difficult to pin-point the findings in the present study to contribute towards exercise intolerance as a normal horse could have a relatively high prevalence of both murmurs and dysrhythmias.

Twenty-four percent of the horses showed the presence of more than 1 abnormality related to the systems. Morris (1991) reported that out of 275 racehorses with a history of poor racing performance, 84% of the horses were diagnosed as suffering from multiple problems. A lower percentage of horses showing multiple abnormalities in this study could probably be due to a smaller sample size used. However, the finding correlates with the supposition that inadequate athletic performance is often caused by a constellation of abnormalities requiring a comprehensive approach to diagnosing decreased athletic capability.

Cardiac recovery index (CRI) was measured in this study to assess the fitness level of the racehorses. CRI is one of the tools used by veterinarians to decide the fitness level of a horse in endurance race. It is not a diagnostic tool, but rather an indicator or warning signal that something is amiss when there is an eighth beat or higher CRI, which warrants further investigation of the horse's metabolic and pain status during a competition. Hence, the application of the CRI in this study helps to designate the fitness range of these non-performing race horses and at the same time indicates the presence of any pain status as a consequence of ongoing pathology that may be present in these horses.

Conclusion

The present preliminary study demonstrated that the musculoskeletal, respiratory and cardiovascular abnormalities were present in a considerable number of non-performing race horses at the Selangor Turf Club, Sungai Besi. Treadmill exercise, endoscopic study, cardiac auscultation and lameness evaluation are feasible tools to evaluate abnormalities in these systems in non performing race horses. However, new dimensions of clinical evaluation using high-speed treadmill videoendoscopy, exercising telemetric electrocardiography, and stress echocardiography can be extra valuable tools

for a definite diagnosis pertaining to evaluation of poor performance in racehorses. Cardiac recovery index (CRI) is related to fitness and to some extent the winning probability of the race horses.

References

1. Dabareiner NR, Cohen MD, Carter GK and Moyer NW (2005). Musculoskeletal problems associated with lameness and poor performance among horses used for barrel racing: 118 cases (2000–2003). *J Am Vet Med Assoc* **227(10)**:1646-1650.
2. Ferrucci F, Zucca E, Di Fabio V and Ferro E (2003). Treadmill Endoscopic Findings in 15 Racehorses Presented for Poor Performance, *Vet Res Commun* **27 Suppl**:395–397.
3. Holcombe SJ (2004). Tracheal mucus is associated with poor racing performance in Thoroughbred horses. *Proc Am Assoc Equine Prac* **50**:172-173.
4. Jose CE, Young LE, Newton JR and Marlin DJ (2006). Cardiac arrhythmias during and after treadmill exercise in poorly performing thoroughbred racehorses. *Equine Vet J (Suppl.)* **36**:163-70.
5. Lane JG, Bladon B, Little DRM, Naylor JRJ and Franklin SH (2006). Dynamic obstructions of the equine upper respiratory tract. Part 1: Observations during high speed treadmill endoscopy of 600 Thoroughbred racehorses. *Equine Vet J* **38**:393-399.
6. Martin, BB, Reef VV, Parente EJ, and Sage AD (1999). Clinical evaluation of Poor training and Racing performance in 348 horses (1992-1996). In *Proceedings of Annual Convention of AAEP 1999*. pp108-117.
7. Morris EH and Seeherman HJ (1991). Clinical evaluation of poor performance in the racehorse: the results of 275 evaluations. *Equine Vet J* **23**:169–174
8. Parente EJ (2005). Upper airway obstruction disease in Performance Horses. In *Proceedings of Annual Convention of AAEP*.
9. Patteson MW (1996). *Equine Cardiology*. Blackwell Science Ltd. UK.

Comparison of Blood Parameters in Horses in Different Types of Exercises

Mok Hsiao Li, ¹Noraniza Mohd. Adzahan, ¹Bashir Ahmad,

²Rasedee Abdullah & ³Mohd Ariff Omar

¹Department of Veterinary Clinical Studies

²Department of Veterinary Pathology and Microbiology

³Department of Veterinary Preclinical Sciences

Faculty of Veterinary medicine, Universiti Putra Malaysia

Abstract

Blood samples from 22 horses in different types of exercises which are, riding school, patrolling, lunging, leisure and endurance-ride were analyzed for plasma lactate, aspartate aminotransferase (AST), creatine kinase (CK) and plasma cortisol. Data on the breed, age, gender and the result for parameters at pre -and-post exercise were collected. Datasets were analyzed for the differences in blood parameters at post-exercise level for different types of exercises and the differences in pre- and post-exercise parameters in each type of exercises. There were significant differences ($P<0.05$) in plasma lactate, AST and cortisol values between types of exercises at post-exercise level where endurance-ride horses had the highest level while patrolling horses had the lowest. There were no significant differences in CK values at post-exercise level in all types of exercises but riding school horses achieved the highest value. When AST, CK and plasma cortisol were compared across all types of exercise for pre- and post-exercise level, leisure and endurance-ride horses differ significantly ($P<0.05$) from riding school, patrolling and lunging horses while there was no significant difference in plasma lactate at pre- and post-exercise level in all types of exercises. There were significant correlation ($P<0.01$) in AST and plasma lactate together with plasma cortisol and lactate at post-exercise levels. There was also significant correlation at ($P<0.05$) in plasma cortisol and AST at post-exercise level. In this study it is evident that the more intensified and the longer the duration of exercise, the higher the values of plasma lactate, AST, CK and cortisol. Therefore, endurance ride shows higher values followed by leisure ride, riding school, patrolling and lunging. This indicates that increase in exercise intensity, resistance and duration is necessary for training to stimulate an adaptive response to exercise.

Keywords: horse, lactate, AST, CK, cortisol

Introduction

The equine athlete experiences significant musculoskeletal adaptations during conditioning and competition (Gibbs *et al.*, 1995). Muscle activity can be evaluated by measuring serum enzymes and metabolites that are released from cells during exercise. Lactate is released from muscle cells during anaerobic glycolysis (Kronfeld *et al.*, 1995). Lactate concentration not only can be used as an indicator of physical condition but also can be related to performance (Evans *et al.*, 1995). Creatinine is produced from the decomposition of creatine, a nitrogen compound used by muscle cells to store energy. The serum concentration of creatinine varies according to creatine synthesis and the amount of muscle tissue of the animal (Stockham, 1995). AST is one of the parameters used

to show the maximal activity in skeletal muscles. It is a sensitive indicator of acute cell destruction and the activity of AST may increase in skeletal muscle destruction.

The main physiological stimulus to the body and the best example of a normal stress is probably exercise. In this situation hormone adrenaline and cortisol play a major role in dealing with stress of exercise (Marlin and Nankervis, 2002). The two major functional effects of cortisol are substrate mobilization and immune modulation. In normal horses, they recover quickly once the stress of exercise or raceday is finished. The normal adrenal axis strives to maintain daily mean cortisol levels within a fairly narrow range (Alexander and Irvine, 1998). Plasma cortisol concentrations are particularly high after endurance exercise which is 30% higher than other activities. Cortisol will be higher in untrained horses and takes longer to clear from the blood after exercise compared to horses that were trained. Cortisol level will be at its peak between 10 and 30 minutes following exercise and will return to baseline levels 2 hours following intense exercise (Marlin and Nankervis, 2002). Over-stressed horses can be identified when fluctuations of plasma cortisol concentrations are no longer showing a circadian rhythm. In chronic stress, it causes changes in the adrenal axis where it lowers corticosteroid binding globulin (CBG) and raised free cortisol which produces symptoms of hypercortisolemia (Alexander and Irvine, 1998).

Materials and Methods

Twenty-two male and female horses of different ages and breeds were included in this study where 8 horses were sampled from the Equine Centre, Universiti Putra Malaysia while another 14 horses were from the Unit Berkuda, Dewan Bandaraya Kuala Lumpur, Titiwangsa.

Pre-exercise blood samples were collected and post-exercise blood samples were collected immediately after the exercise. The blood was collected in lithium blood tubes using 21-gauge needles. Blood was aspirated from the jugular vein. Samples were placed in an ice box at a temperature of 2 to 4°C. All the samples were brought to the laboratory and centrifuged at 50g for 10 min. Plasma was separated into plasma tubes and stored at -22°C.

The serum biochemistry parameters analysed were lactate, aspartate aminotransferase (AST), creatine kinase (CK) and cortisol. Serum biochemistry was evaluated with an autoanalyser (Hitachi 902® Automatic Analyser). Cortisol was measured using the DSL-2000 Cortisol Radioimmunoassay Kit (Diagnostic Products Corporation, Texas).

Differences in different post-exercise parameters were compared between different types of exercises using one-way ANOVA. Meanwhile the differences in pre-exercise and post-exercise parameter were compared using paired t-test. All statistical analyses were performed using SPSS statistical software version 17.0 at 95% confidence level.

Results

There were significant differences ($P<0.05$) between types of exercises for the post-exercise lactate values where the endurance ride had the highest mean value. Endurance-ride horses showed significantly higher values than horses in the other four types of exercises (Table 1). When types of exercises were compared in post-exercise AST levels, there were significant differences ($P<0.05$) between endurance-ride horses in comparison to the other four types of exercises (Table 1). The mean value for post-exercise AST value for endurance ride (460.63 U/L) is two times higher than other horse groups. The mean value for lunging was significantly different ($P<0.05$) to leisure ride and

patrolling horses. For post-exercise comparison of CK values between different type of exercises, there were no significant difference ($P<0.05$) in all groups (Table 1). The range for all the horse groups were between 140.00 to 292.75 U/L. Riding school horses had the highest mean value (292.75 U/L) while lunging horses had the lowest mean value (140.00 U/L).

The lactate values of horses were segregated according to different types of exercises; pre- and post-exercise. There were no significant difference ($P<0.05$) in lactate levels pre- and post-exercise in each type of the exercises performed. When the AST values were compared again based on pre- and post-exercise in different types of exercises, there were significant differences ($P<0.05$) in AST levels in pre- and post-exercise of leisure ride and endurance ride while there were no significant differences ($P<0.05$) in other types of exercises. When CK values were compared across types of exercises on pre- and post-exercise level, there were significant differences ($P<0.05$) in leisure ride and endurance horses. From Table 4, the CK levels began at high values in riding school horses and end up with high values but the changes in pre- and post exercise are more significant in endurance horses with the range around 170.00 to 260.00 U/L. When cortisol levels for different types of exercises on pre- and post-exercise were compared, there were significant differences ($P<0.05$) between endurance ride and leisure ride horses.

The general trend in this study was there were significant correlation ($P<0.01$) between aspartate AST and lactate (Table 2) together with cortisol and lactate at post-exercise. Across all types of exercises, when the lactate level was increased, the AST level will also increased. In fact there was a correlation of lactate and AST at post-exercise level (Pearson's correlation= 0.624, $P=0.002$) and correlation of cortisol and lactate at post-exercise level (Pearson's correlation= 0.92, $P= 0.00$). There was significant correlation between cortisol and AST at 95% confidence level (Pearson's correlation= 0.506, $P= 0.016$).

Table 1: Comparison of post-exercise mean value for riding school, leisure ride, patrolling, lunging and endurance ride

Post-exercise Parameters	Types of Exercise				
	Riding School	Leisure Ride	Patrolling	Lungeing	Endurance Ride
Lactate (mmol/L)	0.84 ^a	0.96 ^a	0.73 ^a	0.90 ^a	3.87 ^b
AST (U/L)	276.73 ^a	223.28 ^b	218.13 ^b	267.60 ^{ab}	460.63 ^c
CK	292.75	176.60	140.33	140.00	258.67
Cortisol ($\mu\text{g/dL}$)	4.78 ^a	8.13 ^b	3.36 ^a	5.72 ^a	11.26 ^c

a,b,c: Mean in the same row with different superscript are significantly different ($P<0.05$)

Table 2: Correlations for four biochemical parameters at pre- and post-exercise

	Pre-exercise				Post-exercise			
	AST	Lactate	CK	Cortisol	AST	Lactate	CK	Cortisol
AST	1	-0.190	0.196	0.00	1	0.624**	0.205	0.506*
Lactate			-0.091	0.082			0.131	0.692**
CK				-0.070				0.508

** Correlations are significant at 0.01 level (2 tailed).

* Correlations are significant at 0.05 level (2 tailed).

Discussion

In normal adult horses, the blood lactate concentration have been measured and found to be between 0.6 to 1.5 mmol/L (Lumsden *et al.*, 1980). In this study, the mean value for plasma lactate concentration for pre-exercise is within 0.6 to 0.8 mmol/L in all types of exercises. In post-exercise, the mean plasma lactate level is still less than 1 mmol/L in nearly all types of exercises except for endurance-ride horses which has a mean of 3.87 ± 1.27 mmol/L. After the exercise, the lactate concentrations in all types of exercises are still within the normal range except for endurance-ride horses which has the value up to 5.6 mmol/L. This indicated that during endurance ride, strenuous exercise had been applied therefore more lactate are being produced. A characteristic of elite endurance athletes is that lactate does not begin to accumulate in the blood until the intensity approaches that generating maximal heart rates. The training intensities which generate lactate can shift the lactate accumulation point closer to the maximum heart rate. All endurance horses should receive some anaerobic training but many riders are reluctant to allow their horses to canter or gallop because they believe that this may teach them bad habits during a race. Beneficial results may be obtained by working the horses at lower speeds up-hills or on inclined treadmills if the trainer is reluctant to increase the speed of exercise. For endurance horses, the greater the distance covered during the training session, the greater the benefit to performance. The results for pre-exercise AST level in this study are within the normal range for all types of exercises except for two horses in the endurance-ride group that have values slightly higher than normal which are 395.40 U/L and 417.90 U/L. The normal range for AST level in horse is between 226 to 366 U/L (Meyer *et al.*, 1992). This may be due to continuous and strenuous exercises that cause leakage of enzyme from the cell membrane. The mean post-exercise AST level was highest in endurance-ride horses (460.63 ± 39.67 U/L). This may be due to the continuous strenuous exercise in endurance horses. Pre-exercise CK levels in all types of exercises are within the normal range, which is 80-140 U/L (Meyer, 1995) except for riding school horses. Riding school horses have a minimum value of 151.00 U/L to a maximum value of 548.00U/L. In this study, there is no significant difference between the types of exercises on post-exercise CK levels but endurance ride and riding school horses have values higher than other types of exercises, which are 285.67 U/L and 292.75 U/L. High CK in riding school horses may be due to inappropriate riding techniques that lead to more muscle damage during riding.

Normal plasma cortisol in horses is from 3 to 13 µg/dL (James *et al.*, 1970). Endurance ride achieve the highest value in post-exercise level because endurance ride undergoes the most intense exercise for the longest duration. Therefore endurance horses face the most stress compared to other horses.

References

1. Alexander S and Irvine CHG (1998). Stress in Racing Horse: Coping vs Not Coping. *J. Equine Sci* **9(3)**:77-81.
2. Evans DL, Rainger JE, Hodgson DR, Eaton MD and Rose RJ (1995). The effects of intensity and duration of training on blood lactate concentration during and after exercise. *Equine Vet J* **18**:422-425.
3. Gibbs PG, Potter GD, Nielsen BD, Householder DD and Moyer W (1995). Scientific Principles for Conditioning and Performance Horses. *Proc Anim Sci* **11**:195.
4. James VHT, Horner MW, Moss MS and Rippon AE (1970). Adrenocortical function in the horse. *J Endocrinol* **48**:319-335.
5. Kronfeld DS, Ferrante, PL and Taylor LE (1995). Blood hydrogen ion lactate concentrations during strenuous exercise in horse. *Equine Vet J* **18**:266-269.
6. Lumsden JH, Rowe R, and Mullen K (1980). Haematology and biochemistry reference values for the light horse. *Can J Comp Med* **44**:32-42.
7. Marlin D and Nankervis K (2002). *Equine Exercise Physiology*. Blackwell Science Ltd.
8. Meyer, Coles and Rich (1992). *Veterinary Laboratory Medicine Interpretation and diagnosis*. W. B. Saunders Company.
9. Stockham SL (1995). Interpretation of equine serum biochemical profile results. *Veterinary Clinics of North America: Equine Prac* **11**:391-413.

Microbiological Quality of Raw Rabbit Meat

Sylmie Al-Harir, ¹Latiffah Hassan & ¹Saleha Abdul Aziz

*¹Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

The present study was carried out to examine the microbiological quality and safety of rabbit meat from three different locations in Selangor; Klang, Semenyih and Serdang. The microbiological quality was examined using the Standard Plate Count (SPC) and Coliform Plate Count (CPC), and the detection of foodborne pathogens were performed using established methods. The result showed that two out of six carcasses were positive for *E. coli* whereas one carcass was positive for *Salmonella* sp. The SPC and CPC level in the raw rabbit meat were generally beyond the limit stated in the microbiological guideline for raw meats.

Keywords: rabbit, meat, coliform, *E.coli*, *Salmonella* sp.

Introduction

Rabbits produce white meat that is fine-grained, high in protein, low in fat, highly palatable, and low in cholesterol. Rabbit carcasses are only 20% bone. In addition, high quality rabbit skins are used in fur garments and trimmings (Ewbank *et al.* 1999). In Malaysia, rabbit meat is not readily available in the supermarkets or wet markets. To obtain rabbit meat, one can purchase it directly from the local rabbit farms. Unlike other meats, such as poultry and beef that has been well-studied in relation to its level of hygiene and safety, no studies has been done on rabbit meat. The present study examined the microbiological quality of rabbit meat that was purchased from several sources in Selangor, namely, Semenyih, Klang and Serdang. The specific objectives of the study were to estimate the total number of microorganism and the number of indicator organisms (i.e. coliforms) in raw rabbit meat, and to detect *Salmonella* sp. and *E.coli* from the meat.

Materials and Methods

Source of Rabbits

Rabbit meat is not highly accessible, unlike chicken or beef. Rabbit meat was obtained from three small farmers from a few areas in Selangor (Klang, Semenyih and Serdang). Two rabbits were purchased from each farmer. Upon request, the farmer slaughtered the rabbits, skinned and cut them into smaller pieces. These pieces were packed into sterile plastic bags, placed in a polystyrene ice box filled with ice cubes and taken to the Public Health Laboratory at the Faculty of Veterinary Medicine, Universiti Putra Malaysia, within 24 h.

Microbiological Analysis

Standard Plate Count (SPC) was conducted to determine the number of aerobic and facultative anaerobic, mesophilic bacteria per unit weight of rabbit meat following established procedures. The Coliform Plate Count (CPC) was conducted to determine the number of aerobic and facultative anaerobic, mesophilic coliform bacteria per unit weight of rabbit meat following established

procedures. Briefly, 10 g of meat samples from representative areas of each carcass was homogenized in a stomacher followed by serial dilutions. From the dilution of 10^{-4} to 10^{-6} , aliquots of 0.1 mL was plated for SPC using the spread plate method and 1 mL was plated for CPC using the pour-plate method. The results were expressed as Colony-Forming-Units (CFU) per gram of meat sample.

Detection of Salmonella and E. coli

Culture and identification of *Salmonella sp.* and *E.coli* was carried out according to established methods. Biochemical tests for *Salmonella sp.* detection comprises of Lysine Iron Agar Test (LIA), Triple Sugar Iron Test (TSI), Urea Test, Citrate Test, and Sulphide- Indole- Motility Test (SIM). The same tests were performed for *E.coli* detection but with an addition of Methyl Red Test. Biochemical tests were carried out according to standard procedures. Serological test, using Salmonella Polyvalent O antisera, was done on suspected *Salmonella* colony from an overnight culture for confirmation of genus.

Results

A total of six rabbit carcasses were examined. According to the Microbiological Guideline for Meat by the Department of Veterinary Services (DVS) Malaysia, the SPC for raw meat must be below 2.5×10^6 CFU per gram of meat sampled. For CPC, the value which is safe for human consumption is below 2.4×10^3 CFU per gram of meat sampled. No *Salmonella* should be detected and <100 CFU of *E. coli* should be found per gram of meat.

The SPC results indicated that the mean level of microorganisms found was generally lower than that established in the guideline (Table 1). Only meat from retailer C exceeded the guideline value. However, all CPC recorded was much higher than that of the guideline (Table 2). The highest CPC was recorded in meat from retailer A.

E. coli and *Salmonella sp* were detected in two and one carcasses, respectively. Meat from retailer A was positive for both *E. coli* and *Salmonella*.

Table 1: Mean number of colonies from the Standard Plate Count from rabbit carcasses

Source	Carcass Number	CFU/g	Mean CFU for each retailer per gram sample
Klang (retailer A)	1	11.6×10^5	6.6×10^5
	2	16×10^4	
Semenyih (retailer B)	3	10.6×10^4	8.3×10^4
	4	6×10^4	
Serdang (retailer C)	5	2×10^4	22×10^6
	6	45×10^6	

Table 2: Mean number of colonies from the Coliform Plate Count from rabbit carcasses

Source	Carcass Number	CFU X /g	Mean for each retailer per gram meat sample
Klang (retailer A)	1	83 x 10 ⁴	43 x 10 ⁴
	2	3.8 x 10 ⁴	
Semenyih (retailer B)	3	5.6 x 10 ⁴	4.6 x 10 ⁴
	4	3.5 x 10 ⁴	
Serdang (retailer C)	5	< 1	1.9 x 10 ⁴
	6	3.7 x 10 ⁴	

Discussion

The number of rabbits sampled in this study was small because the price of rabbit was expensive and our resources for this study were very limited. In addition, unlike chicken and beef, rabbit meat was not readily available or highly accessible in the markets.

All rabbit meat sampled had a high level of CPC, however retailer A in Klang yielded the highest CPC value and was positive for *E.coli* and *Salmonella sp.* In the authors' observation, Farmer A (in Klang) practiced a backyard system and also raises poultry and ducks in the same premise. Therefore, it was likely that cross-contamination had occurred either from where the animal was raised or during slaughtering because other animals (duck and poultry) were also slaughtered in the same area. Since the farmer practices backyard production system, the slaughtering practice and hygiene application during meat production may not be adequate. According to Comin, *et al.* (2006), cross-contamination commonly occurs due to sharing of equipments, environment and facilities for processing animals other than rabbits.

Rabbit meat from Semenyih yielded low levels of SPC and CPC and this was consistent with the authors' observation that the retailer in Semenyih raised only rabbits and produces rabbit products. It is a commercial farm that focuses on breeding rabbits for meat, for agro-tourism and as pets and does not raise other animals.

Coliform has been used as the principal indicator of faecal contamination in both tropical and temperate countries. This group of bacteria also may signal the presence of other foodborne pathogens (Tauxe and Esteban, 2007). However, finding large numbers of coliform in meat does not indicate with certainty that direct faecal contaminations has occurred. It may suggest other possibilities such as using inadequately cleaned equipment, unhygienic processing of foods and post-processing contamination. In this study, *Salmonella sp* and *E. coli* were detected at a low level in the rabbit meat. Comin *et al* (2006) and Little *et al* (2008) reported similar findings. Low levels of *E. coli* in raw meat

are considered common. In an ideal situation, no pathogens should be found in ready-to-eat meat products. Nonetheless, since the samples were raw, the detection of the pathogens suggests that this pathogen may reach the consumers if the product is eaten in its raw or semi-cooked form. However, since the sample size of the study is very limited, its findings must be interpreted with caution and further studies may need to be carried out to reach a more definitive conclusion.

Acknowledgement

The authors thank the Veterinary Public Health and Bacteriology laboratory personnel for their kind technical assistance.

References

1. Comin D, Mioni R, Gallochio L, Bordin P and Maniero, C (2008). Microbiological Quality and Safety of Rabbit Meat in Veneto Region, Italy. In: Proceedings of the 9th World Rabbit Congress, June 10-13, 2008, Verona, Italy. pp1331-1336.
2. Ewbank R, Kim-Madslien F, and Hart CB (1999). Management and Welfare of Farm Animals. Universities Federation for Animal Welfare (UFAW). 4th Edition. (<http://www.vegsoc.org/info/rabbit.html>). Accessed on: 08/01/2009.
3. Little CL, Richardson JF, Owen RJ, de Pinna E, and Threlfall EJ 2008. *Campylobacter* and *Salmonella* in raw red meats in the United Kingdom: Prevalence, characterization and antimicrobial resistance pattern, 2003–2005. *Food Microbiol* **25**:538-543
4. Tauxe RV and Esteban EJ (2007). Advances in Food Safety to Prevent Foodborne Diseases in the United States *in* Silent Victories, Ward JW and Warren C (eds). Oxford University Press Inc, NY USA.

Conditions Associated with Long Distance Endurance Race in Horses

Nurul Hudah Sulimai, ¹Bashir Ahmad & ¹Noraniza Mohd Adzahan

*¹Department of Veterinary Clinical Studies
Faculty of Veterinary medicine, Universiti Putra Malaysia*

Abstract

The study was conducted to assess conditions associated with long-distance endurance race in horses. A total of thirty-seven active Arab endurance horses were examined with emphasis to permanent changes of musculoskeletal condition such as splint, tenosynovitis, desmitis, tendonitis, osselet and work-related injury such as scar, saddle sore or pressure sore. The prevalence, distribution of lesions and severity of condition were recorded and compared. Splint has the highest prevalence at 27.9% with most located at mid-cannon, on the medial side of the limb. This is followed by saddle sore with 26.4% prevalence with most located lateral of withers. Permanent scar shows 14.7% prevalence with most located at the area of cannon bone and lower extremities. Tenosynovitis show 14.7% prevalence with most occurring in greater racing distance population. Pressure sores of the limb shows 7.4% prevalence with most located at the left forelimb. Suspensary desmitis shows prevalence at 4.4% with all of the cases located at the left forelimb. Tendonitis shows 4.4% prevalence.

Keywords: endurance horses, splints, saddle sore, scar, tenosynovitis, pressure sore.

Introduction

Endurance riding is an equestrian sport which is based on controlled long distance races. Low intensity endurance training, up to several hours, could be associated to certain condition or injury in relation to loading history such as exercise and racetrack terrain. Overtraining of endurance horses tend to be more of a problem than under-training. Endurance horses compete and train over some of the most highly variable terrain of any sport horses. They go up rocky hills, through creeks, across sandy ground and grassy fields, along tarmac and on other surfaces depending on where the ride or race is held. Course terrain has a bearing on the type of injury in a predictable way. On rocky grounds, more horses have stone bruises and painful joint injuries whereas on soft sandy grounds, more horses have ligament and tendon injury.

Investigations lead to identification of factors causally related to injuries such as tack placement, bandaging technique, course terrain and distance of race. Modification of the management of these risk factors could enhance injury prevention in the future.

Materials and Methods

A total of 37 active Arab endurance horses were selected from various classes of racing distance of 40 km, 60, 80, 120 and 160 km. From the sample population, the horses were trotted to eliminate horses that show signs of lameness. Physical examination was performed on horses by visual examination and palpation especially on skin, ligaments, tendons and joints to identify the conditions such as tendonitis, osselet and splints.

Results

The prevalence of each condition is shown in Figure 1 and Table 1. Splint has the highest prevalence at 27.9%. This is followed by saddle sore at 26.4% prevalence. Permanent scar and tenosynovitis show 14.7% of prevalence each. Pressure sore shows prevalence of 7.4%, while suspensory desmitis and tendonitis at 4.4% prevalence each.

Table 1: Prevalence of conditions associated with endurance race

Conditions/ Injuries	No. of cases	Prevalence (%)
Splints	19	27.9
Saddle sore	18	26.4
Permanent scar	10	14.7
Tenosynovitis	10	14.7
Pressure sore	5	7.4
Suspensory desmitis	3	4.4
Tendonitis (SDF)	3	4.4
Total	68	100

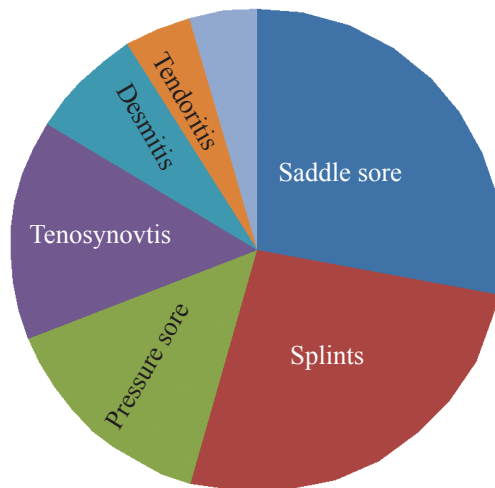


Figure 1: Prevalence of conditions associated with endurance race

Discussion

There are many factors that could cause injuries and development of condition such as lack of fitness, poor conformation, poor equipment, poor technique, accidents and rider factors such as rider's weight, ability and fitness (Bromiley, 2007).

Splints are associated with training and subsequent injury between the small metacarpal or metatarsal bones and cannon bone, resulting in inflammation or tearing of the interosseous ligament. From the result, the majority of the splints are located at the area of mid-cannon on the medial side. The second metacarpal is more frequently involved because of the difference in its articulation with the carpus. The factors that are associated with splints are excessive loading, conformation abnormalities, improper shoeing and imbalanced nutrition (Stashak, 2002).

Saddle sore is defined as area of localized friction between saddle and skin (Colin, 2006). It is usually caused by a poor-fitting saddle or inappropriate tack. These are normally found around the withers, where the skin is thin and there is no cushioning muscle or fat. From the result, the majority of the saddle sore were located at lateral of withers compared to point of withers. This is associated with weight distribution and pressures put on by the contact of saddle surface.

Scar is a result of wound. From the result, more than half of the scars detected were at the area of cannon bone. This is the result of wound caused by trauma during training or competition. A study of injuries in event horse by Singer, *et al.* (2008) stated that, during the cross-country phase of competition, the most common injuries were lacerations and abrasions to the carpus and stifle.

Tenosynovitis is an inflammation of the synovial membrane and is characterized by distention of the tendon sheath due to synovial effusion. From this study, in all of the tenosynovitis cases, the condition present bilaterally at both hindlimbs at the tendon capsule. All the cases are from horses with greater racing distances, 80, 120 and 160 km respectively. This is due to the heavy workload from the longer distances.

Some injuries are associated with faulty handling of the animal such as pressure sore of the limb which is caused by faulty bandaging techniques. Bandaging has a variety of purposes namely warmth, support, protection and immobilization. (Karen *et al.*, 2006). From the result, the majority of the saddle sore were found to be at the left fore limb. This is relevant because horses trained & raced anticlockwise are prone to have injury on left forelimbs compared with right forelimbs.

From this study, all of the suspensory desmitis cases are found to be at the left forelimb. Stashak (2002) described injuries to the suspensory ligament into three areas; proximal suspensory desmitis, body lesions and branch lesions. All of these cases were from the 120 and 160km distance racehorses.

Conclusion

The conditions associated with long-distance endurance race are scar from trauma, work-related injuries such as saddle sore and pressure sore of the limb, and musculoskeletal conditions such as splints, tenosynovitis, suspensary desmitis and tendonitis. The conditions with the highest prevalence in the study is splints, followed by saddle sore, permanent scar, tenosynovitis, pressure sore, suspensary desmitis and tendonitis. Conditions such as saddle sore and tenosynovitis showed higher prevalence among the horse population with racing distances of 80, 120 and 160 km.

References

1. Bromiley, M. W. (2007). *Equine Injury, Therapy and Rehabilitation*. 3rd ed., Blackwell Publishing. pp35 & pp65-70.
2. Colin, V. (2006). *The Complete Performance Horses: Feeding, Fitness, Lameness, Preventive Medicine*. 1st ed. David and Charles Publishing. pp235.
3. Karen C. and Karen B. (2006). *The Complete Equine Emergency Bible: The Comprehensive Guide to Coping with Every Horse-Related Emergency from First Aid to Road Safety*. 1st edition. David and Charles Publishings. pp21.
4. Singer, ER., Barnes J., Saxby F. And Murray J.K. (2008). Injuries in the event horse: Training versus competition **175**: 76-81.
5. Stashak, TS. (2002). *Adas' Lameness of Horses*. 5th ed., Lippincott Williams & Wilkins. pp 819 and pp 623.

Effect of Medium-Chain Triacylglycerols on Piglets in Farms in Sepang, Malaysia

**Yong Chiun Khang, ¹Engku Azahan Engku Ahmed,
²Ooi Peck Toung & ³Fong Chee Wee**

¹Department of Veterinary Preclinical Sciences

²Department of Veterinary Clinical Studies

Faculty of Veterinary Medicine, Universiti Putra Malaysia

³Sunzen Corporation Sdn Bhd., Shah Alam, Malaysia

Abstract

The aims of this study were to determine the effect of medium-chain triacylglycerols (MCT) on growth performance, mortality rate and faecal coliform count in piglets, and to compare the effect of MCT on piglets from porcine reproductive and respiratory syndrome (PRRS)- and porcine circovirus 2 (PCV2)-affected farms with that of a status-free farm. Twenty-four litters were selected from two PCV2- and PRRS-affected farms in Sepang. Each litter was divided into control (fed orally with 4 mL normal saline) and treatment (fed orally with 4 mL MCT) groups on days 1, 3, 5 and 7. Piglets treated with MCT showed higher growth performance and lower fecal coliform bacteria count than the control piglets. No difference in piglet mortality was detected between farms. A similar pattern was observed in the PCV2- and PRRS-affected and status-free farms. The MCT-treated piglets had higher body weights than the control animals. In conclusion, MCT supplementations had positive effects on the growth performance of piglets as a consequence of increased body weight and average daily gain. In addition, MCT were able to reduce fecal coliform bacteria in piglets besides being effective in all the farms investigated.

Keywords: medium-chain triglycerides (MCT), growth, fecal coliform, mortality

Introduction

Pre-weaning mortality varies considerably among production units, ranging from 5 to 39% of piglets born alive (Wieland *et al.*, 1993). Energy insufficiency was identified as one of the major causes of pre-weaning mortality. The neonatal piglets are prone to develop hypoglycemia due to the limited liver glycogen that can supply the energy requirement and the insufficient gluconeogenesis in newborn piglet. The runt piglets would not be able to compete with others for milk causing starvation and mortality. The energy insufficiency also increases the susceptibility of the piglets to hypothermia, especially during nights and rainy days. The cold stress would suppress the immune system, making the pigs more susceptible to diseases and increasing mortality (Too, 1997). This condition is aggravated if the farms are plagued with porcine reproductive and respiratory syndrome (PRRS) and postweaning multisystemic wasting syndrome (PMWS). Among the problems associated with these syndromes are obvious illness, late abortion, increased stillbirths, and increased preweaning mortality. Porcine reproductive and respiratory syndrome-affected suckling piglets would appear depressed, show rapid abdominal breathing, unable to nurse, weak and die shortly after farrowing.

Due its unique digestive and metabolic properties, the medium-chain triacylglycerols (MCT) are used in a variety of nutritional settings. Medium-chain triacylglycerol supplementation has been claimed to

be a remedy for energy insufficiency (Wieland *et al.*, 1993). Hydrolysis of MCT in the body produces medium-chain fatty acids (MCFA) (Velazquez *et al.*, 1996). The MCTs were reported to be naturally-occurring antimicrobial agents that could be used for growth promotion, preventive treatment and curative treatment (Dierick *et al.*, 2002). It is postulated that the MCTs also effect coliform bacteria growth in pig. Therefore, the aims of this study were to determine the growth rate, mortality rate and fecal coliform count in MCT supplemented piglets and to compare the effects of MCT-supplementation in piglets from PCV2- and PRRS-affected with those from status-free farms.

Materials and Methods

Experiment Animals

Twenty-four litters, 12 from each of two farms were selected for the study. Eight piglets in each litter were chosen and randomly distributed into two groups, which were the control and MCT-treated groups. The farms chosen had a history of PMWS and PRRS and were diagnosed to be positive for these diseases. Prior to the treatment, the piglets were allowed free access to colostrum. All the daily routine farm activities such as iron supplements and needle teeth removal were intact and performed equally on the control and treated groups.

Treatments

The first group of piglets were dosed with 4 mL normal saline (0.9%) and the second group of piglets were dosed with 4 mL MCT on the same days. The treatments were instituted on days 1, 3, 5 and 7. The piglets of each sow from both groups were weighed on days 1, 5 and 9.

Growth Performance and Mortality Rate

The parameters measured in this study were litter size, body weight, average daily gain (ADG), and percentage body weight gain, cumulative weight of the siblings and mortality.

Coliform Plate Count

Twelve fecal samples, six each from the treatment and control groups were taken for coliform count. The count was done by adding 1 g fecal sample to 9 mL peptone broth, followed by ten-fold serial dilutions with peptone broth. One millilitre aliquots of each dilution were then transferred to their respective petri dishes, to which 15 mL of sterile molten Violet Red Bile agar (VRBA) was added. The petri dishes were incubated at 35°C for 24 h before performing bacterial colony counts.

Results and Discussion

Weight Gain

Piglets fed with MCT had higher mean body weight, ADG and percentage body weight gain (Figures 1, 2 and 3). Medium-chain triglycerides can be used by the newborn piglets as spare critical fuels and for glycogen and protein storage prior to birth (Benevenga *et al.*, 1989). The animals supplemented with MCT in the diet showed a higher mucosal mass and protein content and increased villus length and crypt depth in the proximal part of the small intestine (Galluser *et al.*, 1993). It has been reported that the MCTs may also enhance calcium and amino acid uptakes and effect intracellular protein synthesis positively. The net effect of MCTs is better growth performance of piglets. The improvement of the growth performance could have been more pronounced had this study been conducted over a longer period. The MCT produced the most pronounced daily growth rate in the first two weeks after weaning at 21 days (Dierick *et al.*, 2002).

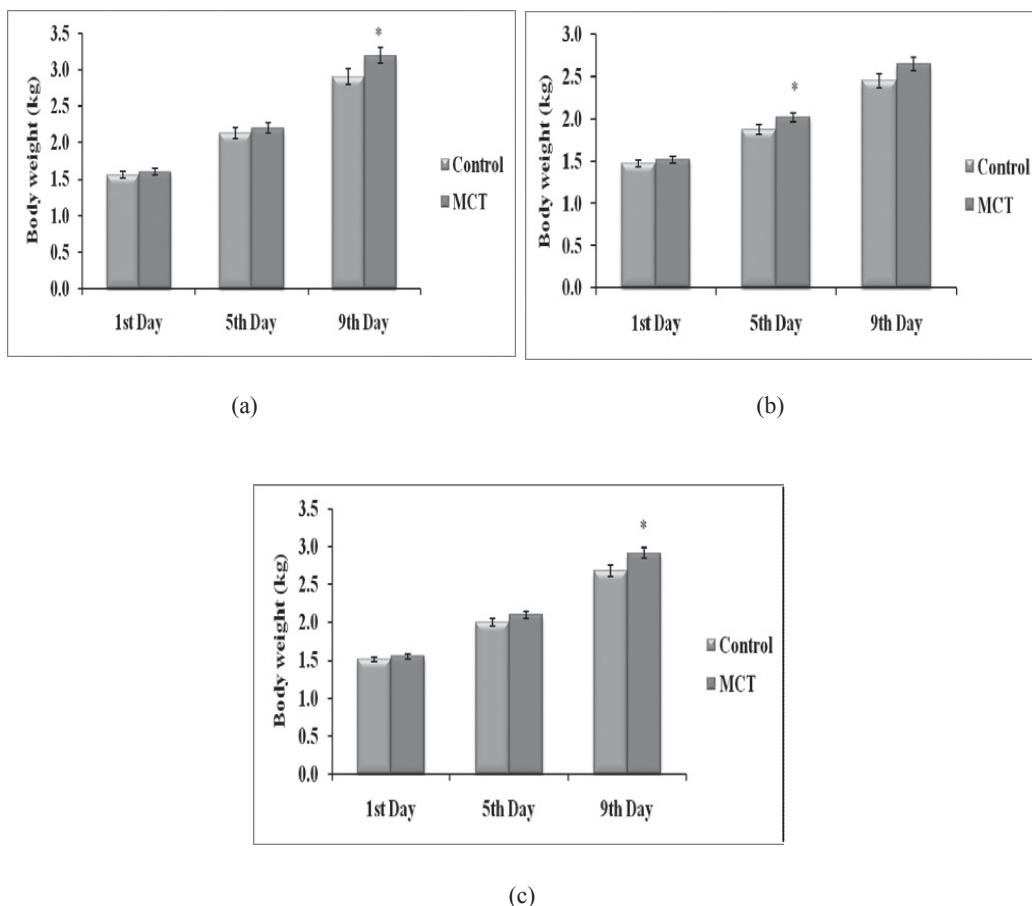
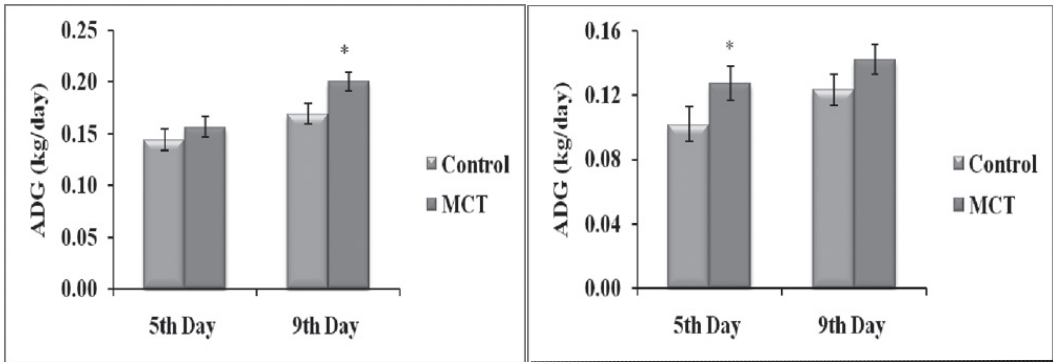


Figure 1: (a) Body weight of piglets in farm A. The MCT group had higher body weight on the 5th and 9th days, with statistical significance on the 5th day; (b) Body weight of piglets in farm B. The MCT group had higher body weight on the 5th day (significant on the 9th day); (c) Combined body weight of piglets. The MCT group had higher body weight on the 5th day and significantly higher on the 9th day. Error bar indicates standard error (SE) of mean. Means with * are significantly different ($p < 0.05$).

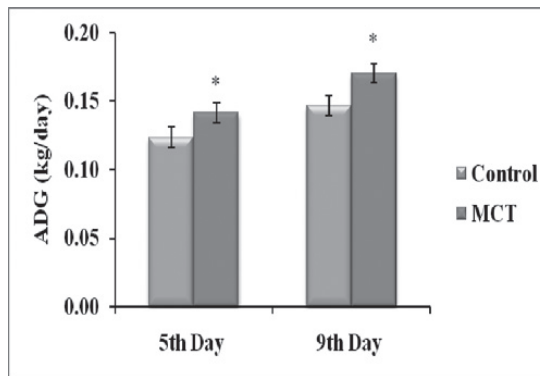
Mortality Rate

Two piglets each from the control and MCT-treatment groups died during the experiment. Although no difference in mortality rate was observed, the piglets of the control group were smaller, weaker, dull and depressed compared to the MCT-treatment piglets. Piglets of the MCT-treatment groups performed better probably due to their better energy status since MCTs have been reported to be a good energy source with high digestibility and oxidation rates (Lee and Chiang, 1994).



(a)

(b)



(c)

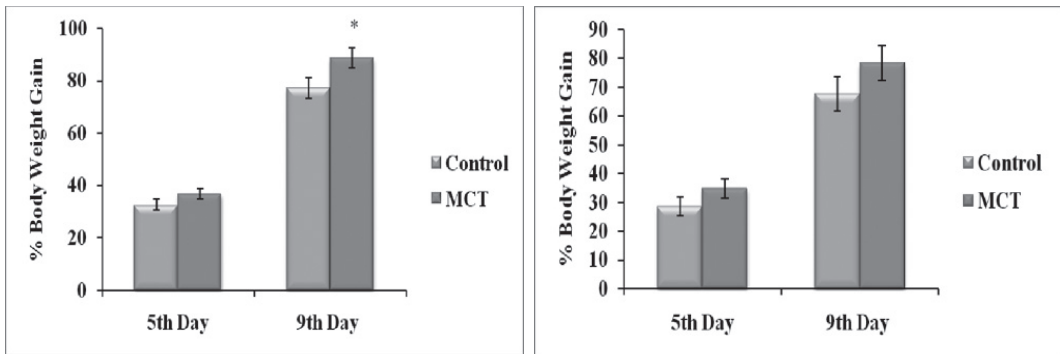
Figure 2: (a) Average daily gain of piglets in farm A. The MCT group had higher ADG, statistically significant on the 5th day; (b) Average daily gain of piglets in farm B. The MCT group had higher ADG, statistically significant on the 9th day; (c) Combined result of average daily gain of piglets. The MCT group had significantly higher ADG than the control group. Error bar indicates standard error (SE) of mean. Means with * are significantly different ($p < 0.05$).

Fecal Coliform Count

Although there were no significant difference ($p > 0.05$) in fecal coliform count between the MCT treatment and the control piglets, MCT-treated piglets were observed to have lower fecal coliform count (Figure 4). This finding is consistent with a previous experiment on MCFA against colibacillosis which indicated that MCFA were able to inhibit bacterial growth *in vitro* (Gallois *et al.*, 2008). Pathogenic bacteria including *Pseudomonas*, *Campylobacter*, *Salmonella typhimurium*, *Staphylococcus aureus*, *Streptococcus agalactiae*, *Helicobacter pylori* and enterotoxigenic *E. coli* can be inactivated by MCFA or their monoglycerides (Isaacs *et al.*, 1992; Petschow *et al.*, 1998). *E. coli* is reported to be the predominant fecal coliform species that lead to piglet diarrhoea (Tortor *et al.*, 2007). The inactivation of faecal coliform including *E. coli* by MCFA would be beneficial to the farm.

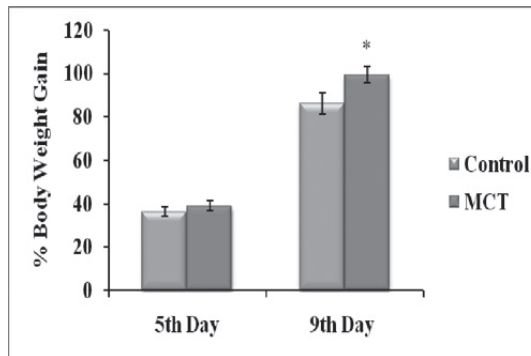
Comparison between PCV2-, PRRS- affected and Status Free Farms

In this study, both farms A and B were PCV2 and PRRS status-positive farm. The results showed that the body weights of MCT group of piglets were higher than that of the control group and were statistically significant on the 9th day [Figure 5(a)]. The experiment conducted in PCV2 and PRRS status-free farms showed that the body weights of MCT-treated piglets were higher than that of the control piglets group and were statistically significant on the 6th and 8th day [Figure 5(b)]. In the PCV2- and PRRS-affected and status-free piglets, a similar pattern of higher body weight with MCT treatment was also observed. The results showed that the MCTs were effective in increasing body weights of piglets in both the status-free and infected farms.



(a)

(b)



(c)

Figure 3: (a) Percentage of body weight gain of piglets in farm A. The body weight gain of the MCT group was higher than that of the control group; (b) Percentage of body weight gain of piglets in farm B. The MCT group had higher body weight gain than that of the control group and statistically significant on the 9th day; (c) Combined result of percentage of body weight gain. The MCT group had higher body weight gain than that of the control group and statistically significant on the 9th day. Error bar indicates standard error (SE) of mean. Means with * are significantly different ($p < 0.05$).

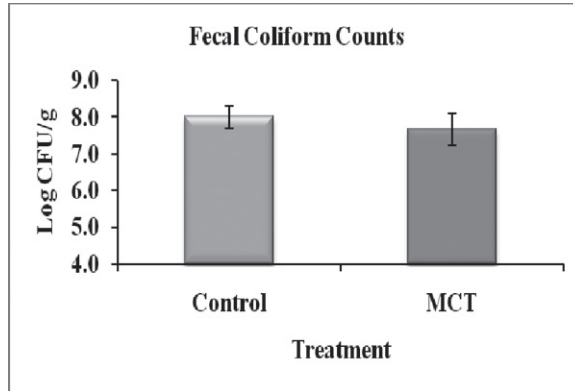
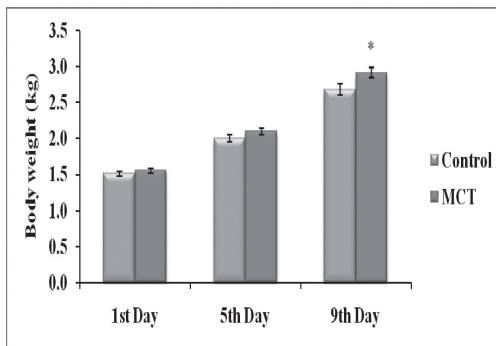
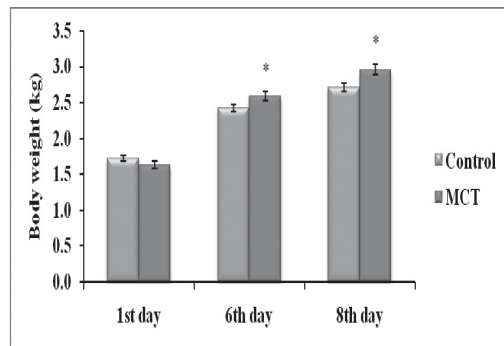


Figure 4: Fecal coliform counts of piglets from farm A and farm B. The MCT group showed lower fecal coliform count than that of the control group. Error bar indicates standard error (SE) of mean.



(a)



(b)

Figure 5: (a) The effect of MCT on body weight piglets of PCV2- and PRRS-affected farms. The MCT group showed higher body weight than that of the control after the first day, which became statistically significant on the 9th day; (b) The effect of MCT on body weight of piglets of PCV2 and PRRS status-free farm. The MCT group showed higher body weight than that of the control after the 1st day and became statistically significant on the 6th and 8th day. Error bar indicates standard error (SE) of mean. Means with * are significantly different ($p < 0.05$).

Conclusion

Medium-chain triacylglycerol supplementations in piglets produced higher growth rate than the untreated piglets as shown by the higher body weights, average daily gain and percentage of body weight gain. No difference in mortality rate was observed between the MCT supplemented piglets and the control piglets. The fecal coliform counts in MCT supplemented piglets were lower than those of the untreated piglets. Medium-chain triacylglycerol was effective in stimulating growth rate in the PCV2- and PRRS-affected farm and status free- farm. In conclusion, the MCT is a good supplement for piglets in stimulating growth.

References

1. Benevenga, N.J., Steinman-Goldsworthy, J.K., Crenshaw, T.D. and Odle, J. (1989). Utilization of medium-chain triglycerides by neonatal piglets: I. Effects on milk consumption and body fuel utilization. *J Anim Sci* **67(12)**: 3331-3339.
2. Dierick, N.A., Decuypere, J.A., Molly, K., Van Beek, E. and Vanderbeke, E. (2002). The combined use of triacylglycerols (TAGs) containing medium chain fatty acids (MCFAs) and exogenous lipolytic enzymes as an alternative to nutritional antibiotics in piglet nutrition: II. In vivo release of MCFAs in gastric cannulated and slaughtered piglets by endogenous and exogenous lipases; effects on the luminal gut flora and growth performance. *Livestock Prod Sci* **76**: 1-16.
3. Gallois, M., Gidenne, T., Orengo, J., Caubet, C., Tasca, C., Milon, A. and Boullier, S. (2008). Testing the efficacy of medium chain fatty acids against rabbit colibacillosis. *Vet Microbiol* **131**:192-198.
4. Galluser, M., Czernichow, B., Dreyfus, H., Gosse, F., Guerold, B., Kachelhoffer, J., Doffoel, M. and Raul, F. (1993). Comparison of different lipid substrates on intestinal adaptation in the rat. *Gut* **34**:1069-1074.
5. Isaacs, C., Litov, R., Marie, P. and Thormar, H. (1992). Addition of lipases to infant formulas produces antiviral and antibacterial activity. *J Nutr Biochem* **3**: 304-308.
6. Lee, H.F. and Chiang, S.H. (1994). Energy value of medium-chain triglycerides and their efficacy in improving survival of neonatal pigs. *J Anim Sci* **72(1)**:133-138.
7. Petschow, B., Batema, R., Talbott, R. and Ford, L. (1998). Impact of medium-chain monoglycerides on intestinal colonisation by *Vibrio cholerae* or enterotoxigenic *Escherichia coli*. *J Med Microbiol* **47**:383-389.
8. Too, H.H.L. (1997). A guide to pig diseases in Malaysia. 1st ed., Percetakan advance Sdn. Bhd., Malaysia.
9. Tortor, G.J., Funke, B.R. and Case, C.L. (2007). Microbiology an introduction. In environmental and applied microbiology. 9th edition, Pearson Benjamin Cummings., USA. pp 827.
10. Velazquez, O.C., Seto, R.W. and Rombeau, J.L. (1996). The scientific rationale and clinical application of short-chain fatty acids and medium-chain triacylglycerols. *Proceedings of the Nutrition Society* **55(1B)**:49-78.
11. Wieland, T.M., Lin, X. and Odle, J. (1993). Utilization of medium-chain triglycerides by neonatal pigs: effects of emulsification and dose delivered. *J Anim Sci* **71(7)**:1863-1868.

Seroprevalence of Common Viral Infections in the Red Junglefowl (*Gallus gallus spadiceus*)

Syamsiah Abdul Ghani, ¹Siti Suri Arshad & ¹Shaik Mohamed Amin Babjee

*¹Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

This study investigated the status of Newcastle disease virus (NDV), infectious bronchitis (IB), infectious bursal disease (IBD), reovirus (REO), chicken anemia virus (CAV) and avian influenza (AI) antibodies in wild and captive Red Junglefowl (*Gallus gallus spadiceus*) in the Klang Valley of Peninsular Malaysia. These viruses are endemic in Malaysia and can cause economic losses to the poultry industry. The objective of this study is to determine the serological status of NDV, IB, IBD, REO, CAV and AI in wild and captive Red Junglefowl using ELISA. Fifty-seven Red Junglefowl comprising 15 pure bred, 10 low-crossed and 32 high-crossed birds were sampled randomly. All sera were assayed using commercial indirect enzyme-linked immunosorbent (ELISA) kit for antibody detection. For vaccinated group, 65.6% (21 out of 32) were positive for NDV antibodies and all of them had antibodies to IBV. For the unvaccinated group, the highest prevalence was against IBD, followed by CAV, REO, NDV and AI. Seropositives to CAV and IBD were seen in all the Red Junglefowl studied. The survey showed that 92% (23 from 25) had antibodies to IB. Approximately 91% (52 from 57) had antibodies to REO and about 52% (13 out of 25) were seropositive against NDV. Only 3.5% (2 from 57) were found positive for AI.

Keywords: avian influenza, chicken anemia virus, infectious bursal disease, infectious bronchitis, Newcastle disease, reovirus, Red Junglefowl, ELISA

External Abnormalities and Microbiological Evaluation of Cutaneous Lesions in Two Endangered Chelonians, *Batagur baska* and *Callagur borneoensis* in Captivity

Chong Shu Chuin, ¹Reuben Sharma,

¹Abdul Rani Bahaman & ²Vellayan Subramaniam

*¹Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia.*

²Faculty of Medicine, Universiti Teknologi MARA

Abstract

The present study was conducted to identify the common cutaneous lesions and deformities seen in captive chelonians, with special emphasis on two highly endangered Malaysian species, *Batagur baska* and *Callagur borneoensis*. A total of 126 chelonians namely, *Batagur baska* (n=28), *Callagur borneoensis* (n=24), *Cuora amboinensis* (n=23), *Heosemys grandis* (n=30), *Heosemys spinosa* (n=1), *Manouria emys* (n=15), *Orlitia borneensis* (n=3), *Siebenrockiella crassicollis* (n=1) and *Amyda cartilaginea* (n=1) were examined at various zoos and parks in Peninsular Malaysia. Physical examinations were conducted and the occurrences and extent of the lesions on the carapace and plastron recorded, measured and scored. Cutaneous samples were taken aseptically for microbiological evaluations. Bacteria and fungus isolated were identified using standard bacteriological protocols. Antimicrobial sensitivity tests were conducted based on the disc diffusion method. External abnormalities and deformities were observed in 37.3% of the chelonians, of which *Batagur baska* and *Callagur borneoensis* accounted for 85.7 and 35.7%, respectively. The most common abnormality of *Batagur baska* involved the plastron (91.7%) followed by obesity (75.0%). In *Callagur borneoensis*, the lesions were confined to the carapace (77.8%) and plastron (66.7%). A wide variety of bacteria were successfully isolated from the cutaneous lesions including pathogenic species, namely, *Aeromonas* spp., *Bacillus* spp., *Citrobacter* spp., *Enterobacter* spp., *Klebsiella pneumoniae*, *Morganella morganii*, *Pantoea agglomerans*, *Pasteurella/Mannheimia testudinis*, *Proteus* sp., *Serratia* sp. and *Vibrio parahaemolyticus*. Due to the differences in bacterial susceptibility, the most effective antimicrobial combination for cutaneous lesions were enrofloxacin, tetracycline, and chloramphenicol with variable success using other aminoglycosides. Fungal isolation demonstrated the presence of *Aspergillus flavus*, *Aspergillus fumigatus*, *Aspergillus niger* and *Mucor* sp. It is evident that captive reared turtles succumb to various cutaneous lesions and abnormalities as a sequel to improper housing, management and nutrition. It is therefore imperative that any attempts to keep these chelonians in captivity for the intention of captive propagation, must first address these basic issues in order to ensure the success of *ex situ* conservation efforts.

Keywords: external abnormalities, cutaneous lesions, captive chelonians, *Batagur baska*, *Callagur borneoensis*, microbiological evaluation, antibiotic sensitivity tests.

Anticancer Effects of Tamoxifen, Doxorubicin and RhuEPO-doxorubicin Combination on Canine Mammary Tumour Cells

Low Soon Siok, ¹Rasedee Abdullah & ²Teo Guan Young

*¹Department of Veterinary Pathology and Microbiology,
Faculty of Veterinary Medicine*

*²Institute of Bioscience,
Universiti Putra Malaysia*

Abstract

Canine mammary gland tumour is the most common tumour in intact bitches but currently there is no guideline for treatment beyond surgery. This study compares the anticancer properties of tamoxifen, doxorubicin and combination of recombinant human erythropoietin (rHuEPO) with doxorubicin simultaneously (EDOX1) and sequentially with rHuEPO treatment first followed by doxorubicin (EDOX2). For both treatments the rHuEPO: doxorubicin ratio was maintained at 1 (UI/mL):1 ($\mu\text{g}/\text{mL}$). In the first part of the study, the anticancer effects of tamoxifen CMT-stylo (canine mammary tumour cell line) which is ER-negative and PR-positive were compared with MCF-7 (human breast cancer cell line) which is ER-positive and PR-positive, using the MTT assay. After 72 h of treatment, the IC_{50} of tamoxifen for CMT-stylo cell line is $7.8 \mu\text{g}/\text{mL}$ compared to $5.4 \mu\text{g}/\text{mL}$ for MCF-7 cell line. From cell cycle analysis using flow cytometry, more MCF-7 cells underwent apoptosis than CMT-stylo cells as the results of treatment with $4 \mu\text{g}/\text{mL}$ tamoxifen for 24, 48, and 72 h. Then, the possible role of rHuEPO in modulation of the effects of doxorubicin was examined using EDOX1 and EDOX2. The effects on the cell cycle analysis was more apparent with EDOX1 and EDOX2, where both produced higher percentages of CMT-stylo cells in synthesis phase compared to tamoxifen and doxorubicin treatments at 24 and 48 h. Subsequently at 48 and 72 h, the number of cells in apoptosis increased markedly, eventually passing the number in synthesis phase. The EDOX2 produced a higher rate of apoptosis than EDOX1 in the CMT-stylo and MCF-7 cell lines.

Keywords: canine mammary gland tumour, tamoxifen, doxorubicin, erythropoietin, EDOX1, EDOX2, MTT assay, flow cytometry

Histological and Quantitative Assessment of the Syrinx of Malayan Peacock-pheasant (*Polyplectron malacense*), Hill Mynah (*Gracula religiosa*) and Green-winged Pigeon (*Chalcophaps indica*)

Mohd Hafidz Mohd Izhar, ¹Shanthi Ganabadi & ²Jalila Abu

¹Department of Veterinary Preclinical Sciences

²Department of Veterinary Clinical Studies

Faculty of Veterinary Medicine, Universiti Putra Malaysia

Abstract

Three carcasses each from three species of wildlife birds, namely Malayan Peacock-pheasant (*Polyplectron malacense*), Hill Mynah (*Gracula religiosa*) and Green-winged Pigeon (*Chalcophaps indica*) were taken from clinical cases that died due to diseases not related to respiratory problem and were sent for post-mortem. Samples of syrinx from these birds were obtained during post-mortem. The cartilage rings of tympanum, tracheosyringeales, pessulus and bronchosyringeales were grossly measured and recorded. The samples were fixed with 10% formalin, embedded and sectioned into 5 µm tissue and stained with Haematoxylin & Eosin and examined under light microscope. Gross morphology showed that the Malayan peacock-pheasant only possesses extrinsic muscle while the Hill mynah possesses intrinsic and extrinsic muscle on the syrinx. The Green-winged pigeon only had a normal syrinx. The syrinx of the Hill mynah was long and adapted to the production of variable short-note sounds. The Malayan peacock-pheasant on the other hand had shorter syrinx but larger in diameter suited to the production of high-pitch and long calls. The Green-winged pigeon which was not considered as songbird had a small and short syrinx thus produces low pitch sounds. Histologically, almost all cartilage groups in the syrinx of the three species studied were hyaline cartilage. The pessulus and tracheosyringeales of the Hill mynah and Malayan peacock-pheasant composed of ossified cartilage. In the production of sound by these birds, the contributing factors are size and length of the syrinx, the soft tissue membrane, and the syringeal muscles.

Keywords: bird, syrinx, histology, quantitative assessment, morphology

Prevalence of *Mycoplasma synoviae* in Commercial Poultry Farms in Malaysia

Chuah Ling Ling & ¹Aini Ideris

*¹Department of Veterinary Clinical Studies
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Mycoplasma synoviae is a very important pathogen that can cause massive economic loss to the poultry industry through carcass condemnation and lowered production. This study was undertaken to investigate the prevalence of *Mycoplasma synoviae* in commercial poultry farms in Malaysia. In this study a total of 510 samples were taken from 17 commercial poultry farms (broilers, broiler breeders, layers and village chickens) located in the West Coast of Peninsular Malaysia. All the samples were taken from the choanal cleft swab and detection of *Mycoplasma synoviae* was carried out using the polymerase chain reaction (PCR). Out from 510 samples, 30 samples were detected to be positive for *Mycoplasma synoviae*. The prevalence of *Mycoplasma synoviae* was 5.88%. Though the prevalence may be considered low, appropriate measure should be taken to reduce the incidence and keep the disease under control.

Keywords: *Mycoplasma synoviae*, polymerase chain reaction (PCR), prevalence, poultry farm, commercial.

Validation of FAMACHA[®] for Diagnosis of Haemonchosis in Goats

Ong Tze Chein & ¹Rehana Abdullah Sani

¹*Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

FAMACHA[®] is a practical on-farm system designed to provide farmers with a quick and easy method to diagnose haemonchosis in sheep and goats. This helps one to make a drenching decision of the individual animal rather than blanket treatment of the entire flock which helps to promote anthelmintic resistance. Although this system is used in South Africa and USA, there is no report on the effectiveness of the FAMACHA[®] system in Malaysia. The objective of this study was to validate the accuracy of the FAMACHA[®] system. One hundred and fifty-nine goats from eight farms in Selangor were selected as samples. Each goat was graded using the FAMACHA[®] system, bled for PCV measurement and faeces taken for determination of faecal egg count (FEC) using the modified McMaster technique. Two separate FAMACHA[®] eye scores (≥ 3 and ≥ 4) were defined as anaemia. There was a fair positive correlation between FEC and FAMACHA[®] eye score ($r=0.27$), strong negative correlation between PCV and FAMACHA[®] eye score ($r=-0.71$) and fair negative correlation between PCV and FEC ($r = -0.40$). The sensitivity increased (96.3%) when FAMACHA[®] scores of ≥ 3 were considered as anaemic, but specificity was low (42.4%). Specificity increased (81.1%) when FAMACHA[®] scores of ≥ 4 were considered as anaemic, concurrently the sensitivity was lower (92.6%). The percentage of false negative (anaemic animals but not identified by FAMACHA[®]) was less than 2% for both FAMACHA[®] cut-off points. Predictive value of negative was greater than 95% for both FAMACHA[®] cut-off points. The data obtained strongly suggests that the FAMACHA[®] system is a useful on-farm tool to identify goats having anaemia due to haemonchosis.

Keywords: FAMACHA[®], FEC, PCV, Goat, haemochosis, anaemia.

Enhancement of Doxorubicin and Doxorubicin-rHuEPO Combination Treatments of Canine Mammary Gland Tumor by Peripheral Blood Mononuclear Cells

Tan Zhang Jian, ¹Rasedee Abdullah & ²Teo Guan Young

¹Department of Veterinary Pathology and Microbiology

Faculty of Veterinary Medicine

²Institute of Bioscience

Universiti Putra Malaysia

Abstract

Immune response plays an important anticancer role. Recently, erythropoietin (EPO) receptors have also been detected on the surfaces of immune cells, which lead to the suggestion that EPO can influence functions of these cells. This study aims to determine the effects of recombinant human erythropoietin (rHuEPO) on the peripheral blood mononuclear cells (PBMC) and the effects of PBMCs on the doxorubicin and doxorubicin-rHuEPO combination treatments of canine mammary gland tumor cells. The PBMCs were obtained from blood samples collected from six dogs at Dewan Bandaraya Kuala Lumpur. The PBMCs were first treated *in vitro* with doxorubicin, rHuEPO and doxorubicin-rHuEPO combination. Flow cytometry analyses showed that doxorubicin have cytotoxic effects while rHuEPO has cytoprotective effects on the PBMCs. The canine mammary gland tumor cells were assigned to five treatment groups for *in-vitro* analyses; untreated control, doxorubicin with PBMC, doxorubicin without PBMC, doxorubicin-rHuEPO with PBMC and doxorubicin-rHuEPO without PBMC and treated accordingly. The cells were then subjected to MTT analysis. The results showed that PBMC improved the doxorubicin and doxorubicin-rHuEPO combination killing of canine mammary gland tumor cells.

Keywords: canine mammary gland tumor, PBMC, doxorubicin, rHuEPO, MTT assay, flow cytometry.

Povidone-Iodine and Tincture-Iodine as Topical Antiseptic for Final Skin Preparation Prior to Abdominal Surgery in Small Animals

Nor Emeliawati Mohamed Napiah, ¹Rashid Ibrahim & ²Zunita Zakaria

¹Department of Veterinary Clinical Studies

*²Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

The effectiveness of Tincture-iodine (TI) and Povidone-iodine (PI) as topical antiseptic for final skin preparation prior to abdominal surgery in small animals was tested by taking swab samples from the skin for 'Immediately after final prep' and '2 min after final prep'. In this study, 4 live cats and 4 live dogs randomly sampled from surgical cases in UVH involving abdominal areas were used. The animals were put under general anaesthesia during the whole sampling procedure and subsequent surgery. The swab samples were obtained and subjected to standard protocols for bacterial Isolation and identification and standard plate count. The colony forming unit (CFU) counts showed that both TI and PI produced 100% bacterial reduction at both sampling times. The study suggests that TI and PI were equally effective as topical antiseptic for final skin preparation prior to abdominal surgery in small animals, immediately after being applied on the animal's skin and prolonged up to 2 min.

Keywords: topical antiseptic, tincture-iodine, povidone-iodine, skin preparation, surgery

Prevalence of Caseous Lymphadenitis in Goats Reared by Small Holder Farmers and Antibiotic Sensitivity Test of *Corynebacterium pseudotuberculosis*

Zubaidah Kamarudin, ¹Abd Aziz Saharee & ²Siti Khairani Bejo

¹Department of Veterinary Clinical Studies

*²Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

In a cross-sectional study of 246 goats from 8 small holder farms, 77 of the animals had evidence of caseous lymphadenitis (CLA) as disclosed by the gel precipitation test. High prevalence of infection was indicated in exposed farms with clinical signs which are 48.6 percent whilst in farms without clinical signs the prevalence is low which only 9.2 percent. Antibiotic sensitivity test showed that *Corynebacterium pseudotuberculosis* is sensitive to the majority of the antimicrobial agent tested.

Keywords: caseous lymphadenitis, goat, small holder farmer, gel precipitation test, antibiotic sensitivity test.

Seroprevalence and Control of Haemorrhagic Septicaemia in Cattle in Endemic and Nonendemic States

Wan A'aidah Wan Hashim & ¹Abd Aziz Saharee

¹Department of Veterinary Clinical Studies

Faculty of Veterinary Medicine, Universiti Putra Malaysia

Abstract

To develop Malaysia into a 'halal' hub, livestock reared in Malaysia must first be free from infectious diseases. This is a retrospective study to determine the prevalence of haemorrhagic septicaemia (HS) in cattle in Malaysia. Data collected from the Department of Veterinary Services Epidemiological Unit between 1994 and 2008 were used to determine the endemic and nonendemic states of Malaysia. Based on the criteria determined by FAO, Perak, Kelantan and Kedah were identified as endemic areas whereas Johor, Perlis and Selangor were HS-free. Serological tests were conducted using ELISA on 150 serum samples from endemic states and 150 serum samples from nonendemic states. Statistical analysis showed, there was no significance difference ($p>0.05$) in serological prevalence between the endemic and nonendemic states. This finding could be due to the free movement of animals from endemic to nonendemic areas. Control measures to maintain freedom from the disease in the nonendemic areas and removal of the disease in the endemic areas are described. In conclusion, the study showed that the serological prevalence of HS in endemic and nonendemic states is similar.

Keywords: haemorrhagic septicaemia (HS), seroprevalence, endemic, nonendemic, ELISA

Comparison of Urine Protein-to-Creatinine Ratio Measured by Dry and Wet Biochemistry Methods

**Grace Leong Huey Mey, ¹Hazilawati Hamzah, ²Goh Yong Meng,
³Mohd Rosly Shaari & ¹Jasni Sabri**

¹Department of Veterinary Pathology and Microbiology

²Department of Veterinary Preclinical Sciences

Faculty of Veterinary Medicine, Universiti Putra Malaysia

³MARDI, Serdang, Selangor, Malaysia

Abstract

Urine protein-to-creatinine ratio (UPC) has been used to determine magnitude of proteinuria. The objective of this study was to compare the accuracy of UPC measured using rapid method (dry biochemistry and dipstick) to the reference method (wet biochemistry). Urine was collected from 52 cats that were selected independently of breed, age, sex, and disease status. The urine was diluted with distilled water. Half of the samples were analysed for urine creatinine with the Reflovet® Plus (ROCHE) and protein with Combur10® (ROCHE). The other half were analysed by BioRex (TRX 7010, Mannheim, Japan). Creatinine, protein and manually calculated UPC were subjected to a Passing-Bablok regression analysis. The UPC values by both methods were not comparable and had significant bias ($Y = -0.620 + 0.836 X$; Intercept A 95%CI: -1.034 to -2.06; Slope B 95%CI: 0.645 to 0.941). Both, Reflovet® and BioRex, creatinine concentrations were comparable and had good correlation ($Y = 585.508 + 0.895 X$; Intercept A 95%CI: -3074.639 to 4245.654; Slope B 95%CI: 0.853 to 1.134). Compared to quantitative protein results (Boirex), Dipstick protein results were not a very good estimate of protein ($Y = -0.542 + 0.707 X$; Intercept A 95%CI: -1.170 to 0.087; Slope B 95%CI: 0.373 to 0.669). Only UPC obtained by the wet biochemistry method is good for screening clinically significant proteinuria.

Keywords: UPC, dipstick, dry biochemistry, wet biochemistry

Feeding of Metabolites Produced from Lactic Acid Bacteria to Replace Antibiotics in Broiler Chickens

Ong Shu, Kai, ¹Mohamed Ali Rajion & ²Loh Teck Chwen

¹Department of Veterinary Preclinical Sciences, Faculty of Veterinary Medicine

²Department of Animal Science, Faculty of Agriculture
Universiti Putra Malaysia

Abstract

The objectives of this study were to study the effect of metabolites (MET) produced from lactic acid bacteria on the growth performance, microflora population and meat quality of broiler chickens. The effects were compared to those in antibiotic fed chickens to determine the possibility of replacing antibiotics as growth promoters in their diet. Two hundred and ninety-four day-old male Cobb chicks were reared for 42 days. There were seven treatment groups, comprising of one negative control without antibiotics or metabolites in the feed, one positive control with antibiotics in the feed, and five test MET groups with different concentrations of liquid metabolites from four strains of *Lactobacillus plantarum* (LAB) added to their feed. The LAB strains were isolated locally from fermented soya bean (*tempeh*) and fermented tapioca (*tapai ubi*). Each treatment group comprised 42 animals in six replicates of seven animals, randomly assigned in battery cages and reared solely indoors. Feed and water were given *ad libitum*. Sixty-three animals randomly selected from the control and treatment groups (nine chickens per group) were halal slaughtered at the end of the feeding trial. Jejunal digesta, abdominal fat pad and breast meat were sampled for microflora population, abdominal fat and meat total cholesterol concentration determination, respectively. Growth performance parameters, which are final body weights, body weight gains, average daily gains, and feed conversion ratios were found to be not significantly different ($P>0.05$) between the MET group and antibiotic group. Feed intake and daily feed intake were significantly different ($P<0.05$) at lower concentration but not at higher concentration ($P>0.05$) for the MET groups compared to the antibiotic group. Microflora population in terms of lactic acid bacteria to Enterobacteriaceae ratio was found to be > 1 and prominently higher in MET groups fed higher doses of MET. There was also no significant difference in terms of abdominal fat and meat total cholesterol among the MET groups and the antibiotic group. There was a tendency of a reduction in feed conversion ratios and meat total cholesterol as four out of five MET groups had lower values than the antibiotic group. Besides, the negative control was not significantly different from the positive control in all the parameters measured, which was possibly due to the optimized rearing environment. In conclusion, it is possible to feed liquid metabolites produced from lactic acid bacteria to replace antibiotics in broiler chicken production.

Keywords: chicken, lactic acid bacteria metabolites, antibiotic, growth performance, microflora population, meat quality

Comparison of Growth and Proximate Composition of Microalgae *Chaetoceros* Sp. and *Nannochloropsis* Sp. Grown under Natural and Controlled Condition

Hew Wei Ee, ¹Mohamed Shariff Mohamed Din & ²Sanjoy Banerjee

¹Department of Veterinary Clinical studies, Faculty of Veterinary Medicine

*²Institute of Bioscience,
Universiti Putra Malaysia*

Abstract

Culturing microalgae outdoor in the natural condition is one of the ways to decrease the microalgae production cost. However, the changes in environment condition may affect the growth and composition of the microalgae. This experiment was carried out to determine the growth and proximate composition of the microalgae *Chaetoceros* sp. and *Nannochloropsis* sp. grown in natural and controlled environments and to determine the reliability of the biomass, cell count and optical density as growth parameters. The growth was monitored daily and at the end of the culture, the microalgae were harvested and the composition of the microalgae determined. The result of the experiment showed that the culture maintained in natural environment culture had a higher growth rate than that under controlled condition. The composition of protein, lipid and carbohydrate microalgae for both natural and controlled condition were similar. The study showed that the biomass, cell count and optical density are reliable parameters for determination of growth of microalgae.

Keywords: growth, microalgae composition, *Chaetoceros* sp., *Nannochloropsis* sp., biomass, cell count, optical density.

Serological Prevalence of Leptospiral Infection in Dogs from Dewan Bandaraya Kuala Lumpur and Selected Private Clinics in Malaysia

Tan Wee Kwan & ¹Abdul Rani Bahaman

*¹Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

This study was conducted to investigate the serological prevalence of leptospiral infection in dogs in Dewan Bandaraya Kuala Lumpur (DBKL) and selected private clinics in Malaysia. Detection of leptospiral infection in dogs has public health significance as it is an important zoonosis. Eighty-one serum samples were collected from stray dogs and pet dogs in DBKL and three private clinics in Selangor. All sera were examined for the presence of leptospiral antibodies by first screening with Enzyme Linked Immunosorbent Assay (ELISA) and then the positive sera were further tested with Microscopic Agglutination Test (MAT). Only five serovars were used in MAT. Seven sera from stray dogs were tested positive by the ELISA. The seven sera, however, failed to show any agglutination when they were examined by MAT. No agglutination was observed with MAT on serum samples from pet dogs and this may be due to the fact that most pet dogs were vaccinated against leptospirosis. The positive stray dog sera were highly suggestive of leptospiral infection. It was shown that ELISA is useful for screening of leptospiral infection while MAT is useful in identifying the causal serovars.

Keywords: dog, leptospirosis, MAT, ELISA, zoonosis

Modulation of Peripheral Blood Mononuclear Cells by Recombinant Human Erythropoietin to Combat Canine Mammary Gland Tumors

Wong Wee Kuan, ¹Rasedee Abdullah & ²Teo Guan Young

¹Department of Veterinary Pathology and Microbiology

Faculty of Veterinary Medicine

²Institute of Bioscience

Universiti Putra Malaysia

Abstract

Advances in immunotherapy for cancer treatment are showing great promise in human medicine and has created interest among the veterinary researchers. Erythropoietin (EPO) stimulates the survival, proliferation, and maturation of the erythroid progenitor cells through binding to the erythropoietin receptors (EPOR). Discovery of EPOR on leukemic cells is suggestive that EPO may exhibit similar effects on the immune cells. In this study, the effects of recombinant human erythropoietin (rHuEPO) were tested on 200, 100, and 50 x 10⁴ cells/mL canine peripheral blood mononuclear cells (PBMC) at rHuEPO concentrations of 0, 2, 4, and 8 IU/mL. Treatment of the canine PBMCs with rHuEPO resulted in increased canine mammary gland tumour cell (CMT-stylo cell line) killing. This increase in killing of CMT-stylo cells is due to the mitogenic and protective effect of rHuEPO. Based on the results, rHuEPO has a positive immunomodulating effect on the canine PBMCs. However, the exact ratio of number of PBMCs to rHuEPO concentration required to produce optimum effect on cancer cells remains unknown. Further studies need to be conducted to ascertain the mechanism of action of rHuEPO as well as to determine the PMBC:rHuEPO ratio for effective immunotherapy of canine mammary gland tumors.

Keywords: canine mammary gland tumour, rHuEPO, immunotherapy, peripheral blood mononuclear cells

Detection of *Ehrlichia canis* Infection via PCR in Dogs from Malaysia

Lim Sue Yee, ¹Malaika Watanabe & ²Goh Yong Meng

¹Department of Veterinary Clinical Studies

²Department of Veterinary Preclinical Sciences

Faculty of Veterinary Medicine, Universiti Putra Malaysia

Abstract

Little is known about the prevalence of *Ehrlichia canis* in Malaysia. Species-specific PCR assay has proven to be a highly sensitive and specific test for the diagnosis of canine ehrlichiosis. In this study the PCR was used for the detection and sequence analysis of *E. canis* in canine blood. Thirty-eight dogs referred to the University Veterinary Hospital (UVH), University Putra Malaysia (UPM) with clinical signs compatible with *E. canis* infection and 55 random dogs from DBKL Dog Pound were included in this study. The PCR assay was carried out using species-specific primers CANIS and GA1UR that amplify a 409 bp fragment of the *E. canis* 16S rRNA gene. The amplified PCR product was sequenced and confirmed as *E. canis* through a BLAST homology search. The *Ehrlichia* had 100% homology with a number of registered *E. canis* strains from Tunisia, Thailand, Italy, Greece, and China. Among the blood samples obtained from UVH dogs, 7.9% (3/38) tested positive for *E. canis* by species-specific PCR. Whereas only 1.8% (1/55) of blood samples from the stray dogs tested positive. All three positive dogs shared similar hematological and biochemical findings that included anaemia, thrombocytopenia and hypoalbuminemia. For each of the three *E. canis*-positive cases, microscopic examination of peripheral blood films was negative for *E. canis*. This is the first record of *E. canis* DNA detection in Malaysia.

Keywords: *Ehrlichia canis*, PCR, prevalence, thrombocytopenia, Malaysia

Prevalence of *Rhodococcus equi* in the National Stud Farm

Liu Shwu Yunn, ¹Zunita Zakaria & ¹Abdul Rahim Mutalib

*¹Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

This study sought to determine the prevalence of *Rhodococcus equi* in the National Stud Farm (NSF) using the selective NANAT media. Identification was done using conventional methods and multiplex PCR assay. Two sets of primers, amplifying the gene of the 16S rRNA and vapA gene, were used to identify the bacteria and to detect the virulent *R. equi*. Antimicrobial resistant pattern of *R. equi* isolates were identified using the standard Kirby Bauer method. Twenty-one *R. equi* isolates were obtained and confirmed through conventional methods which included colonial morphology determination, Gram staining and biochemical tests. Species-specific 16S rRNA gene fragment was amplified successfully using positive control *R. equi* strain 04/06. However, *R. equi* isolates were negative with PCR amplifying gene fragment at 16S rRNA. Mutation at primer binding site of 16S rRNA was speculated. *VapA* gene could not be amplified in this study. Attenuation of *R. equi* strain (4/6) might have occurred due to the curing of the virulent plasmid after frequent passages. *Rhodococcus equi* isolates in this study were particularly susceptible to rifampin, gentamycin and vancomycin. Two *R. equi* isolates were resistant to erythromycin with most isolates being only just susceptible to erythromycin. Development of erythromycin-resistant *R. equi* may pose some problems to the treatment of *R. equi* infections.

Keywords: *Rhodococcus equi*, virulence, multiplex PCR, mutation

Propagation of Newcastle Disease Virus in Various Cell Lines

Mohd Firdaus Ariff Abdul Razak, ¹Aini Ideris & Tan Sheau Wei

¹Department of Veterinary Clinical Studies

Faculty of Veterinary Medicine, Universiti Putra Malaysia

Abstract

Newcastle disease virus (NDV) is the infectious agent of Newcastle disease in poultry. There are several reports on the propagation of NDV in different cell lines. However, not all cell lines can support the growth of NDV. In this study, 3 strains of NDV, namely V4-UPM, F and Mukteswar (S) strains, were propagated in MDCK, Vero, CHO, DF-1 and CEF cell lines. The virus was propagated for up to 2 passages. The cells were observed for signs of virus propagation by the CPE formation and susceptibility of the cells towards different strains of NDV. The results revealed that MDCK cells were most susceptible to NDV particularly the V4-UPM strain. It can be concluded that among the cell lines tested, MDCK is the best for NDV propagation. The V4-UPM strain also adapts easily to all cell lines and produced higher titers than the F and Mukteswar (S) strains.

Keywords: newcastle disease virus, propagation, cell lines, adaptation, virus titer

Serological and Bacteriological Prevalence of Leptospiral Infection in Rats in Universiti Putra Malaysia Serdang Campus

Ismida Hanis Md Harun, ¹Abdul Rani Bahaman & ¹Siti Khairani Bejo

*¹Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

This study was carried out to determine the serological and bacteriological prevalence of leptospiral infection in rats found in UPM campus. Sera from 30 rats of various ages, trapped in 7 different places around UPM were examined. Two serological tests namely MAT and ELISA were used for the detection of leptospiral infection in the rats. Five serovars; namely *australis*, *canicola*, *icterohemorrhagiae*, *javanica*, and *pomona* were used as antigens in the MAT. ELISA revealed the presence of leptospiral antibodies in 17% (5/30) of the rats. Kidney samples from all 30 rats were cultured into JS semisolid medium and incubated at 30°C. The MAT for the sera and kidney bacteriological cultures, however, were negative in all the samples tested. The high prevalence of leptospirosis in rats in UPM campus showed that there is a high possibility of lecturers, students and workers in UPM contracting leptospirosis from infected rats.

Keywords: leptospirosis, rats, ELISA, MAT, kidney culture.

Caprine Mastitis and Antibiotic Resistant Patterns in Smallholder Goat Farms

Ainul Shazreen Abdul Aziz, ¹Siti Khairani Bejo & ²M. Murugaiyah

¹Department of Veterinary Pathology and Microbiology,

²Department of Veterinary Clinical Studies,

Faculty of Veterinary Medicine

Universiti Putra Malaysia

Abstract

Mastitis is common among all dairy and meat producing livestock. In this study, 58 lactating does from 7 smallholder goat farms in Selangor and Negeri Sembilan were tested. The animals were mostly of the Boer, Jamnapari and Katjang breeds. The California Mastitis Test (CMT) was done on all lactating does in the selected farms to detect the infection status of the udders. Forty-one percent (24/58) of the lactating does were positive for mastitis while the others were normal. Ten percent (2/24) of the does were clinically infected while the other 90% (22/24) had subclinical mastitis. A total of 90 bacterial isolates from 13 genera were obtained from the 48 milk samples. Gram-positive organisms were the major group of bacteria involved in mastitis in this study. The bacteria that were isolated and identified in this study were *Staphylococcus aureus*, *Staphylococcus epidermidis*, other coagulase-negative *Staphylococci* such as *Staphylococcus hyicus* and *Staphylococcus saprophyticus*; *Bacillus* species, *Corynebacterium* species, *Arcanobacterium pyogenes*, *Nocardia* species, and *Neisseria* species. The most common pathogens associated with caprine mastitis were *Staphylococcus* spp. (77.7%). The most predominant pathogens were *Staphylococcus aureus* (40%), followed by coagulase-negative *Staphylococci* (25%). About 50% of the isolates were resistant to penicillin and almost all isolates were sensitive to gentamycin.

Keywords: caprine mastitis, california mastitis test, lactating goat, bacteria isolation, identification, antibiotic sensitivity test

Bovine Mastitis and Antibiotic Resistance in Smallholder Dairy Farms in Malaysia

Noor Ismaliza Ismail, ¹Siti Khairani Bejo & ²M. Murugaiyah

¹Department of Veterinary Pathology and Microbiology

²Department of Veterinary Clinical Studies

Faculty of Veterinary Medicine, Universiti Putra Malaysia

Abstract

Bovine mastitis is the most common problem in the dairy farms contributing to economic losses due to reduced milk quantity and quality, treatment cost and condemnation. This study was conducted in three small dairy farms in Malaysia. The California Mastitis Test (CMT) and bacteria isolation method were used to determine the status of mastitis in these farms. Of the 55 cows tested, 52.72% were CMT-positive; 93% of which were subclinical mastitis and 7% clinical mastitis. Bacteria isolation showed that *Staphylococcus spp* was the predominant organism. The highest percentage bacteria isolated was *Staphylococcus aureus* (26.53%) followed by *Staphylococcus hyicus* (12.24%), *Staphylococcus saprophyticus* and *Staphylococcus epidermidis* (both 10.20%), *Streptococcus viridians* (10.20%), *Actinomyces spp* (6.12%), *Streptococcus dysgalactiae* (4.08%), *Corynebacterium diptherium* and *Bacillus spp* (both 2.04%) and other nonsignificant organisms (4.08%). *Klebsiella pneumoniae* and *Escherichia coli* (both 4.08%) were the most common gram-negative bacteria isolated. Antimicrobial sensitivity test were performed with neomycin, gentamycin, streptomycin, cephalixin, vancomycin, trimetophrim-sulfamethazole, penicillin, amoxicillin and amoxicillin-clavulanic acid. Most of the bacteria (63.64%) were resistant to cephalixin. *Klebsiella pneumoniae* and *Escherichia coli* were the most resistant organisms.

Keywords: bovine mastitis, bacteria, CMT, antimicrobial sensitivity test.

Electroencephalogram, Blood Oxygen Saturation and Electrocardiogram Changes Associated with Temporary Carotid Artery Compression in Anesthetized Goats

Au Lai Yin, ¹Goh Yong Meng & ²Chen Hui Chen

¹Department of Veterinary Preclinical Sciences

²Department of Veterinary Clinical Studies

Faculty of Veterinary Medicine, Universiti Putra Malaysia

Abstract

Anatomical and physiological studies on the cerebral circulation in goats and sheep have demonstrated that these animals are suitable models to study acute cerebral ischaemia. In these species, almost the entire brain is supplied by blood from the branches of the common carotid arteries. Blood supply from vertebral arteries is confined to the cervical spinal cord and does not extend further forward than the mid-medullary region. In the goat and sheep, in contrast to the situation found in other species, the vertebral arteries do not unite to form the basilar artery; instead, at the level of the atlas vertebrae, they terminate and anastomose with the occipital artery to form a well-developed occipito-vertebral anastomosis. This study was conducted to determine the disruption to the EEG (electroencephalography), ECG (electrocardiography) activities and blood gases changes during unilateral and bilateral carotid cross clamping in 5 anaesthetized goats. The EEG was quantified with spectral analysis. The EEG, ECG and blood gas changes were determined before, during and immediately after unilateral and bilateral carotid artery cross-clamping. Unilateral carotid artery cross-clamping showed no conclusive result. However, EEG activity and oxygen tension were depressed while carbon dioxide tension increased during bilateral carotid artery cross-clamping. All animals recovered from the surgery and returned to normal feeding activity within 24 h. These results indicated that the collateral blood supply route, such as occipito-vertebral anastomosis is sufficient to maintain cortical activity in goat. In conclusion, our study showed collateral blood supply route(s) and activation of compensatory mechanisms are sufficient to buffer against effects of unilateral carotid artery cross clamping, while brain activity levels and blood oxygen are immediately and significantly suppressed after double carotid artery cross-clamping.

Keywords: goats, cerebral ischemia, electroencephalogram, blood gas, carotid artery cross-clamping

Cyclical Variation of Blood Parameters in Healthy Goats under Tropical Condition

Foo Chen Yin, ¹Goh Yong Meng & ²Rasedee Abdullah

¹Department of Veterinary Preclinical Sciences

*²Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Cyclical oscillation has been studied in a variety of physiological and behavioural processes. However, most of the studies were performed under temperate climates with seasonal changes and varying lengths of day and night. Therefore, the aim of the present study was to investigate the cyclical changes in physiological, hematological and biochemical parameters due to both inherent biological rhythm, and entrainment as a result of photoperiod changes in goats under tropical climate. Eight female 6-month-old Boer goats were used in this study. They were subjected to 1 wk of continuous day light exposure during the first period of experiment (LL), and then natural day and night cycle for a week in the second half of the trial (LD). Serial blood sampling was performed every 3 h from 0800 to 2300 during each of this period to measure hematological parameters and hematochemical parameters. Physiological parameters (body temperature) were also recorded simultaneously. It was found that the body temperature, monocyte count, MCV, sodium, calcium, inorganic phosphate, urea, triglyceride and glucose concentration showed significant rhythmic changes with time. Body temperature showed significant cyclical variation under both continuous illumination (LL) and light-dark (LD) cycle. Under different photoperiod condition, the parameters exhibited different cyclical changes. The body temperature showed significant cyclical variation in both the LL and LD cycles. Other parameters only exhibited significant cyclical changes in either LL or LD cycle. Therefore it can be concluded that light-dark cycle and sampling times are important determinants of the accuracy of the highly cyclical haematological, hematochemical and physiological parameters in goats.

Keywords: biological rhythm, photoperiod, goats, hematology, blood biochemistry

Screening Bacteria for Potential Probiotics from Wild Boars

Fong Vin-xen, ¹Ooi Peck Toung, Tan Do Yew & ²Zainal Zahari Zainuddin

¹*Department of Veterinary Clinical Studies, Faculty of Veterinary Medicine
Universiti Putra Malaysia*

²*Jabatan Perhilitan, Kuala Lumpur, Malaysia*

Abstract

The aim of this study was to isolate and select potential probiotics from wild boars (*Sus scrofa*). Samples consisting of cut intestinal segments and contents from the small intestine, caecum and large intestine were collected into MRS (de Man, Rogosa and Sharpe) broth from five freshly hunted wild boars. Isolation and in vitro preselection including antibiotic susceptibility, tolerance to acidic pH, haemolytic activity and inhibition of *Salmonella* strains were performed. Seven strains were selected after testing based on their susceptibility towards penicillin and methicillin. All the strains were gram-positive and catalase-negative which are presumptive of lactic acid bacteria. All were cocci in shape except strain 3 which were rod in shape. In general, all were susceptible to most of the antibiotics except those that were known to be lactic acid bacteria intrinsic resistances (vancomycin, trimethoprim sulphamide and neomycin). The exception was strains 5 which was resistant or intermediately susceptible to all of the antibiotics tested. Strains 1, 4, 5 and 6 survived pH 2 incubation. All strains showed no haemolytic activity and inhibited *Salmonella* strains tested with no remarkable difference between minimal inhibitory dilution values. Overall, strains 1 and 6 were the most favourable probiotic candidates.

Keywords: *Sus scrofa*, probiotics, lactic acid bacteria

A Preliminary Study of Haematology and Serum Biochemistry of Captive Malayan Porcupine (*Hystrix brachyura*)

Ahmad Fikri Ahmad Yunus, ¹Abd. Wahid Haron,

²Hazilawati Hamzah & ³Zainal Zahari Zainuddin

¹Department of Veterinary Clinical Studies

*²Department of Veterinary Pathology and Microbiology
Universiti Putra Malaysia*

³Jabatan Perhilitan, Kuala Lumpur, Malaysia

Abstract

Haematology and serum biochemistry analyses provide rapid diagnostic tools for monitoring the health status and diagnosis of diseases in wildlife. In Malaysia, the Department of Wildlife and National Parks (PERHILITAN) has started a breeding programme of Malayan porcupine (*Hystrix brachyura*) for commercialisation and conservation purposes. Thus, the establishment of reference data for complete haematology and serum biochemistry in the Malayan porcupine is important. A total number of 31 captive adult Malayan porcupines, consisting of 17 males and 14 females, were used in this study. Blood samples were collected from the femoral artery for complete blood profile analyses using an automated haematology analyser. Morphology of the blood cells was also examined. The results were compared between the sexes. The automated differential WBC count was also compared to the manual count. Results showed that female Malayan porcupines had slightly higher mean corpuscular volume (MCV) and muscle enzyme activity compared to males. The blood cell morphology was similar between male and female porcupines, and also to the blood cells of rodents and other domestic animals. The differential WBC counts of healthy adult porcupines obtained from the automated analyser were comparable to the manual counts. This study however was a preliminary study which provides some basic haematology and serum biochemistry parameters of the Malayan porcupine and may serve as an effective management tool for assessing and monitoring their health status.

Keywords: Malayan porcupine, haematology, serum biochemistry

Prevalence of Canine Hip Dysplasia and Grading of Cases Seen at the University Veterinary Hospital, Universiti Putra Malaysia

Noor Zulfa Shamsuddin & ¹Rashid Ibrahim

*¹Department of Veterinary Clinical Studies
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Canine hip dysplasia (CHD) is perhaps the most common developmental defect in dogs and radiography has played an important role in its diagnosis. In this study, cases of hip problem referred to the University Veterinary Hospital UPM were chosen. Patients' data and ventrodorsal X-rays for the period September 2005 to August 2008 were obtained from the Radiology Unit. Determination of CHD was based on the appearance of definitive radiographic signs. Prevalence was calculated for all cases, based on breed and breed size to identify the possible risk factors of CHD. Only X-rays that meet the standard view of "OFA view" from the sample were evaluated and graded for CHD using the UPM-CHD Method, a combination of the modified Orthopedic Foundation for Animal (OFA) grading system and Neck-shaft angle method (Hauptman, Method B). The scores given were based on the severity of the CHD. Canine hip dysplasia seems to be more prevalent in large-sized than medium-sized dogs. The study showed that breed was the only significant risk factor in development of CHD. The UPM-CHD Method for the grading of CHD is easy to perform and should be applied for all CHD cases.

Keywords: canine hip dysplasia, prevalence, radiology, hip grading

Ginger (*Zingiber officinale*) Extract as an Alternative Anthelmintic against *Haemonchus contortus* in Goats

Siti Norsyakirah Hashim, ¹Arifah Abdul Kadir,

²Rehana Abdullah Sani & ³M. Murugaiyah

¹Department of Veterinary Preclinical Sciences

²Department of Veterinary Pathology and Microbiology

³Department of Veterinary Clinical Studies

Faculty of Veterinary Medicine, Universiti Putra Malaysia

Abstract

Helminthiasis is one of the most important diseases encountered in small ruminants especially goats in this country. The nematode usually found in caprine helminthiasis is *Haemonchus contortus*, a blood-sucking parasite that can cause anaemia and body weight loss. Among anthelmintics that can be used to treat and control *H. contortus* infestations are ivermectin and albendazole. However, anthelmintic resistant is one of the major problems in this country. One of the ways of overcome this problem is to introduce alternative anthelmintics. The plant extract of ginger (*Zingiber officinale*) has been tested and shown to have anthelmintic activity in sheep. This study investigated the anthelmintic activity of ginger in goats. Eighteen 1- to 2-years old goats weighing 20 – 30 kg were divided into three equal groups. Group 1 was treated with 1 mL albendazole/5 kg bwt orally, Group 2 with 1g crude ginger extract/kg orally, and Group 3 was untreated (control). The faecal egg counts (FEC) by McMaster technique and faecal culture for larvae identification were conducted before and at days 5, 7 and 10 after treatment. The egg count reduction (ECR) was calculated for all treatment groups. On day 7 post-treatment, the ECR was 18.96 and 100% in ginger- and albendazole-treated goats, respectively. Although the reduction of FEC in ginger-treated group was low, ginger evidently still has anthelmintic activity.

Keywords: *Haemonchus contortus*, *Zingiber officinale*, goat

Diagnostic Significance of Toxic Neutrophils in Blood Smears of Cats: A Retrospective Study

Balqis Abdul Halim, ¹Hazilawati Hamzah,

²Habibah Arshad & ¹Latiffah Hassan

¹Department of Veterinary Pathology and Microbiology

²Department of Veterinary Clinical Studies

Faculty of Veterinary Medicine, Universiti Putra Malaysia

Abstract

Neutrophils with toxic changes are commonly associated with inflammation and/or infection. It holds strong diagnostic purposes for early diagnosis of diseases. The changes are evaluated through examination of blood smears for the presence of Döhle bodies, cytoplasmic basophilia, cytoplasmic vacuolation and toxic granulation. The purpose of this study was to investigate the prevalence of selected clinical signs, diagnoses, clinicopathologic characteristics along with duration of hospitalisation and treatment cost in cats. The study was also aimed to evaluate the significance of toxic changes in blood smears of diseased cats with particularly normal total WBC count. Cats with toxic neutrophils ($n=121$) and control ($n=121$) were selected based on haematology results obtained from the Veterinary Haematology and Clinical Biochemistry Laboratory, UPM. All data were analysed using Chi-square and Fisher exact tests, and Independent t-test for nominal data and interval variables, respectively. Cats with toxic neutrophils had significantly higher prevalence of dehydration, leukocytosis, left shift and neutrophilia, hyperalbuminaemia, hyperbilirubinaemia, septicaemia and bite wound. The treatment costs were also significantly higher in cats with toxic change. There were no correlation between severity of toxic change and the total WBC, segmented neutrophil, and band neutrophil counts. Diseased cats, either with leukocytosis or normal total WBC counts, had similar degree of toxic change severity. In conclusion, blood smear evaluation may reveal beneficial clinical information for early diagnosis of diseases.

Keywords: toxic neutrophils, cats, blood smear.

Comparative Evaluation of Muscle Fibre Types between the Red Junglefowl (*Gallus gallus spadiceus*), Malaysian Indigenous Chicken (*Gallus gallus domesticus*) and Commercial Broiler Chickens

Shazlina Dolah, ¹Md Zuki Abu Bakar & Lokman Hakim Idris

*¹Department of Veterinary Preclinical Sciences
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Color differences in muscle fibers have been recognized for several centuries. Specifically, Type I 'red' muscle maintains slower contractions that can be sustained for longer periods than the Type II 'white' muscles. Muscle fibers are not distinctively red or white, but are a heterogeneous mixture of the two. Differences in muscle composition are related to the varying functions of the muscle and the need to provide skeletal support and movement. The present study evaluates the proportion of muscle fibers in three different breeds of chickens, namely the Red Junglefowl (*Gallus gallus spadiceus*), Malaysian indigenous chicken (*Gallus gallus domesticus*) and commercial broiler chickens (ROSS), in relation to their physiological activities and environments. Seven each of the Red Junglefowl, Malaysian indigenous and commercial broiler chickens were used in this study. Samples of thigh muscles were preserved using the snap-freezing method and the cryostat sections of the muscles were stained with myosin ATPase. The dark-staining Type I red muscle fibers were most numerous in the Red Junglefowl, followed in order by the Malaysia indigenous and broiler chickens. The differences in abundance of muscle fibres between breeds of chickens may be due to their genetic differences.

Keywords: muscle fibre types, red junglefowl, Malaysian indigenous, broiler.

Preliminary Study of Common Viral, Bacterial and Parasitic Status of Wild Boar in Selangor, Malaysia

Ngo Su Ping, ¹Ooi Peck Toung, Tan Do Yew & ²Zainal Zahari Zainuddin

*¹Department of Veterinary Clinical Studies, Faculty of Veterinary Medicine
Universiti Putra Malaysia*

²Jabatan Perhilitan, Kuala Lumpur, Malaysia

Abstract

Malaysia is a country that has large wild boar population density. The wild boar population in Malaysia has played an important role as carrier of some diseases. Some of the pathogens were detected both in wild boar and domestic pigs. Currently, there are no data regarding the health status of wild boars in Malaysia. Therefore, this study is the first of its kind in this country. In this study the classical swine fever (CSF) and porcine reproductive and respiratory syndrome (PRRS) antibodies were not detected in serum samples from the wild boars. Meanwhile, no band for PRRS was detected when the PCR assay was used for the pooled organ samples. However, all the samples were positive for porcine circovirus type 2 (PCV2). Regarding the lactic acid bacteria, 34.1% of colonies isolated were resistant to all three antimicrobial drugs tested; methicillin, penicillin and vancomycin. Among the colonies isolated 60.9% were resistant to at least two drugs. In addition, 4.5% of colonies isolated were resistant to Vancomycin. Four strains of *Salmonella spp* were isolated. Serological tests using polyvalent antibodies showed that the bacteria were neither *Salmonella Typhimurium* nor *Salmonella Enteritica*. In general, all the strains were susceptible to ampicillin enrofloxacin, neomycin, TMZ, and tetracycline and all the *Salmonella spp* isolated had intermediate resistance to amoxicillin. As for the nasal swabs, *Streptococcus suis* and *Pasteurella multocida* were not detected in the samples. However, there were two other types of gram-negative bacteria isolated, which were *Klebsiella pneumonia* and *Pseudomonas aeruginosa*. Four of five samples examined were positive for parasitic infections. However *Trypanosome* and *Eperythrozoon* were not detected in the samples. Four of the five samples were positive for coccidia. Four of five samples were also positive for strongyles infection, while three were positive for Trichuris and only one sample showed Ascaris infection.

Keywords: wild boar, viral, bacterial, parasitic disease, preliminary study

Histological Evaluation on Osteogenesis of Tubular and Chipped Avian Demineralized Bone Matrix in Pigeons

Pang Le Ling, ¹Jalila Abu & ²Tengku Azmi Tengku Ibrahim

¹Department of Veterinary Clinical Studies

²Department of Veterinary Preclinical Sciences

Faculty of Veterinary Medicine, Universiti Putra Malaysia

Abstract

This study was carried out to histologically evaluate the osteogenic effect of pigeon tubular and chipped demineralized bone matrix (DBM) in a created ulna defects and to compare the differences in osteogenic effects in the tubular with that in the chipped demineralized bone matrix. The ulna bones of the control and treatment groups (demineralized bone matrix implanted in created ulna defects) were sectioned longitudinally, stained with hematoxylin and eosin and observed under a light microscope. The histological examination of the bone tissue showed that there was an absence of new bone formation in all control defects but the created ulna defects were filled with fibrous connective tissue, and muscle fibers. Six weeks following implantation of tubular and chipped demineralized bone matrix, all treated pigeons showed evidence of new bone formation at the site of implantation, however, there was no complete bridging of the gap which indicates that pigeons would require more than 6 weeks for complete healing of the ulna bones. Mesenchymal cells infiltration into the site of DBM implantation differentiated into osteoblasts and chondroblasts. Chondroblasts produced cartilage which then underwent mineralization to form new bone matrix via endochondral ossification. Endochondral ossification was found to be not the only form of new bone formation, as intramembranous ossification and appositional growth of bone were also observed in the site of implantation. No antigenic reaction was observed at the sites of DBM implantation. It can be concluded that the high degree of osteoinductive ability of DBM makes it a useful substitute for massive bone grafts in avian species.

Keywords: tubular and chipped avian demineralized bone matrix, pigeons, histological evaluation.

Investigation and Description of a Latero-flank Approach to Ovariectomy for Puppies, Kittens, Adult Dogs and Cats

Koh Karen, ¹Nadzariah Cheng Abdullah, ¹Gurmeet Kaur Dhaliwal & ²Lim Suit Fun

¹Department of Veterinary Clinical Studies

Faculty of Veterinary Medicine, Universiti Putra Malaysia

²SPCA Selangor, Malaysia

Abstract

The objectives of this project were to determine better landmarks for the incisions of bilateral flank ovariectomy (OVE), to determine the time taken for OVE in young and adult cats and dogs, to determine the ease of learning OVE, and to compare time taken for OVE and OHE. All OVE was done in cadavers. Dissections were done to determine 2 better landmarks (Method A and Method B). Method B was significantly better ($P=0.05$) than Method A. Method B was determined by the intersecting point of the line from the tip of the dorsal spine of the 5th lumbar vertebra and the most posterior point of the ribs. Average time needed for OVE in kitten ($n=6$) was 8.78 min, puppy ($n=6$) was 10.64 min, queen ($n=6$) was 12.84 min and bitch ($n=6$) was 12.38 min. OVE in young animal was significantly faster ($P=0.05$) than in adult animal. OVE in kitten was significantly faster ($P=0.05$) than queen, but OVE in puppy and bitch had no significant difference ($P=0.05$). Novice surgeon did OVE in queen ($n=2$) and the time taken was compared with experienced surgeon. Experienced surgeon was 3 times faster at OVE than novice surgeons while novice surgeons learned quickly. Time required for OHE in live queens ($n=5$) was compared with OVE in cadaveric queens ($n=6$). No significant difference between OHE and OVE times in queens. OHE in live bitch ($n=1$) took 4 times longer than OVE in bitch ($n=6$). Surgical instrumentation for OVE was very much less than for OHE. In conclusion, precise landmark for bilateral flank OVE as developed. The sub-lumbar fat in queens prolonged the OVE but can easily be learned by the novice surgeon.

Keywords: ovariectomy (OVE), cat, dog, landmarks for incision, surgical time

Infectivity of Infectious Laryngotracheitis Virus Isolate of Malaysia in Specific Pathogen Free Embryonated Chicken Eggs

Natrah Abd. Razak & ¹Mohd Hair Bejo

*¹Department of Veterinary Pathology dan Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Infectious laryngotracheitis (ILT) is a common viral respiratory infection in birds caused by a herpesvirus. Chorioallantoic membrane (CAM) route of inoculation has been previously claimed to produce successful rates of virus infectivity. It was the objective of this study to determine the infectivity of ILT virus (ILTV) of Malaysian isolate in specific pathogen free (SPF) embryonated chicken eggs via different routes of inoculation namely, CAM, allantoic sac (AL) and yolk sac (YS). Nine-day-old SPF embryonated chicken eggs were inoculated with ILTV isolate from tracheal samples of ILT field outbreak in a layer farm in Melaka, with birds showing typical gross and histological lesions of haemorrhagic tracheitis and laryngitis, and the presence of syncytial intra-nuclear inclusion bodies in the trachea. The virus was propagated twice in embryonated chicken eggs via CAM route, and the infectivity of the virus was determined via CAM, AL and YS routes with 0.1 mL of ILTV ($10^{4.33}$ EID₅₀/0.1mL). The study showed that, 100 and 5% embryonic mortality at passage 1 and 2 respectively, following inoculation via the CAM route of the virus from tracheal samples. However, in the infectivity groups, ILTV caused 57, 42 and 14% mortality following YS, AL and CAM routes of inoculation, respectively. Grossly, all the embryos showed similar lesions; stunted, haemorrhagic tracheitis, thickening and presence of pocks in the CAM. Histologically, intranuclear inclusion bodies and lymphocytes were detected in the CAM in all groups of the inoculated eggs. Neither gross nor histological lesion was observed in the control group. It was concluded that, ILTV infection can be diagnosed by the presence of intranuclear inclusion bodies in the CAM and trachea of chickens. It appeared that YS is the most sensitive route of inoculation followed by AL and CAM. It is suggested that YS is the better route for isolation and propagation of ILTV from field outbreaks.

Keywords: infectious laryngotracheitis virus (ILTV), intranuclear inclusion bodies, CAM, AL, YS.

Microscopic Evaluation of Breast and Thigh Muscles of the Red Junglefowl (*Gallus gallus spadiceus*), Malaysian Indigenous (*Gallus gallus domesticus*) and Broiler Chickens

Siti Mariam Zainal Ariffin, ¹Md Zuki bin Abu Bakar & Lokman Hamik Idris

*¹Department of Veterinary Preclinical Sciences
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

The microscopic skeletal muscle structure and collagen distribution of the Red Jungle fowl (*Gallus gallus spadiceus*), Malaysian Indigenous (*Gallus gallus domesticus*) and broiler chicken breast (pectoralis major) and thigh (gastrocnemius pars externa) muscles were determined. Ten samples of each breed of chickens were used in this study. The bundle diameters of the breast and thigh muscles of the Red Junglefowl (228.28 and 214.90 μm respectively) and Malaysian Indigenous chickens (238.11 and 193.58 μm respectively) were significantly smaller ($P < 0.05$) than those of the broilers (359.04 and 268.37 μm respectively). The breast muscle bundle diameters were also significantly ($P < 0.05$) larger than that of the thigh in all three breeds of chickens. The breast and thigh fiber diameters of the Red Jungle fowl (28.25 and 30.10 μm respectively) and Malaysian Indigenous chickens (30.40 and 29.80 μm , respectively) were also significantly smaller than those of broilers (46.90 and 38.41 μm , respectively). The distribution of the perimysial collagen was marked in the breast muscle of Red Jungle Fowl and Malaysian Indigenous chicken, while moderate to marked in the broilers. However, in the thigh muscles of the Malaysian Indigenous chickens, the collagen distribution was marked to extensive, while in the broilers, the distribution was similar to their breast muscles. The study showed that there were significant differences in skeletal muscle structures and collagen distribution between Red Junglefowl, Malaysian Indigenous and broiler chickens.

Keywords: skeletal muscle, collagen, red junglefowl (*Gallus gallus spadiceus*), Malaysian Indigenous (*Gallus gallus domesticus*), broiler chicken

Molting Patterns of Captive African and Rockhopper Penguins at the Underwater World Langkawi

Norhana Mohamad Nadzir, ¹Jalila Abu & ²Latiffah Hassan

¹Department of Veterinary Clinical Studies

*²Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

In penguins, the average length of molt and molting patterns varies depending on the species. Based on this reason, this study was conducted to determine the molting patterns of the African (*Spheniscus demersus*) and Rockhopper (*Eudyptes chrysocome*) penguins at the Underwater World Langkawi and to compare the time required for a complete molting of certain body areas between the two species. Records of molting data of individual birds at the facility were used and analyzed. The records were divided into two collection techniques; the duration of feather drop to complete molting (data for 2006, 2007 and 2008) and the duration of molting at the various body parts (data for 2008). The molting patterns and duration for a complete molting at certain body area between the African and Rockhopper penguins were determined from the detailed information on molting patterns such as, molting of leg, tail, back, chest, flippers, neck and head. Observations on the premolting signs and molting patterns in these two species of penguins were also done. From the observations, both species showed premolting signs days before their molting period. The signs include increased amount of food intake, swollen flippers, swollen body and also swollen face. Statistical analysis of the molting patterns of captive African and Rockhopper penguins at the Underwater World Langkawi was done by computing descriptive statistics for the mean and standard deviation. Two-Way ANOVA was used to study the differences in duration for a complete molting and molting at certain body areas between the two species. The mean complete molting in Africans and Rockhoppers were 12 and 26 days respectively. The results clearly showed that Rockhopper penguins took longer to molt than the African penguins with a time ratio of 2:1. The mean values for variables tested, particularly molting of the head, were significantly ($P < 0.05$) higher in the Rockhoppers than the African penguins.

Keywords: African penguin (*Spheniscus demersus*), Rockhopper penguin (*Eudyptes chrysocome*), molting pattern, observation techniques, records.

Effect of Common Chemotherapeutants on Goldfish (*Carassius auratus*) and Guppy (*Poecilia reticulata*) and Their Effectiveness in Controlling External Pathogens

Siti Nurkhadijah Md Yunos & ¹Hassan Hj Mohd Daud

¹Department of Veterinary Clinical Studies

Faculty of Veterinary Medicine, Universiti Putra Malaysia

Abstract

This study evaluated the effect of three chemotherapeutants viz., salt, Neguvon® (Thrichlorfon) and methylene blue on goldfish and guppy. The tolerance of these fishes to recommended chemotherapeutic doses and the effectiveness of these chemotherapeutants in the control of fish ectoparasites (*Argulus*, *Gyrodactylus* and *Ichthyophirius multifiliis*) and aquatic pathogenic bacteria (*Pseudomonas sp* and *Aeromonas sp*) were also determined. Four concentrations of each chemotherapeutants were used; Neguvon®: 0.5, 1.0, 1.5 and 2 ppm, salt (NaCl₂): 5,000, 10,000, 15,000 and 20,000 ppm and methylene blue: 20, 30, 40 and 50 ppm. All fishes (100%) survived at 20,000 ppm salt, 1.5 ppm Neguvon and 30 ppm methylene blue after 96 hr exposure. The chemicals were found to be effective against *Pseudomonas sp.* and *Aeromonas sp.* at all concentrations after exposure up to 1 h. There was no significant difference ($P < 0.005$) in response to different concentrations of chemotherapeutants or time of exposure. Salt at 20,000 ppm was tolerable to the fish and was most effective in the elimination ectoparasite infection at 1 h short-bath treatment.

Keywords: goldfish (*Carassius auratus*), guppy (*Poecilia reticulata*), salt, Neguvon®, methylene blue, ectoparasites, aquatic bacteria

Bacterial Flora of the Cervico-vaginal Mucus of Cows

Irni Jasia binti Ibrahim, ¹Rosnina Yusoff & ²Zunita Zakaria

¹Department of Veterinary Clinical Studies

*²Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

The present study was conducted to determine the bacterial flora of the cervico-vaginal mucus of cows managed at the cattle farm in Taman Pertanian Universiti, Universiti Putra Malaysia and to compare the bacteria present in the cervico-vagina of Kedah-Kelantan and Brangus cows. A total of 30 cows were used in this study, of which 15 were Kedah-Kelantan cows and the other 15 were Brangus cows. The reproductive status of these animals was determined from farm records. Cervico-vaginal swabs were collected from the cows and bacterial isolation and identification was done on the basis of their colony and cell morphologies, biochemical reactions and serology. The most prevalent bacteria found in the cervico-vaginal mucus are *Staphylococcus epidermidis*, followed by, *Corynebacterium* spp., and *Staphylococcus aureus*. The normal bacterial flora of the cervico-vaginal mucus of cows mainly consists of one to three species. There was no significant difference in the genera of bacteria present in the cervico-vaginal mucus of Kedah-Kelantan and Brangus cows.

Keywords: bacterial flora, cervico-vaginal mucus, cows

Antibiotic Resistant *Campylobacter* spp., *Arcobacter* spp. and *Salmonella* spp. in Blood Cockles (*Anadara granosa*) and Carpet Clams (*Paphia undulata*) from Markets in Kuala Lumpur and Selangor, Malaysia

Wong Shy Jye & ¹Saleha Abdul Aziz

¹*Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Twenty blood cockle (*Anadara granosa*) and 20 carpet clam (*Paphia undulata*) samples from wet markets and supermarkets in Kuala Lumpur and Selangor areas were examined for the occurrence of *Campylobacter* spp., *Arcobacter* spp. and *Salmonella* spp. and to determine the antibiotic susceptibility of the isolates. In the isolation for *Campylobacter*, the samples were first enriched before plating on blood-free agar. *Arcobacter* spp. was isolated from blood cockles and carpet clams using membrane filtration technique on a selective agar. Pre-enrichment, enrichment and plating onto two selective agars were applied for isolation of *Salmonella* spp. The blood cockles and carpet clams were negative (0%) for *Campylobacter* while 10% each of the blood cockles and carpet clams were presumptively positive for the *Arcobacter* spp. which required confirmation using PCR technique. The occurrences of *Salmonella* spp. in cockles and carpet clams were 35 and 45% respectively; probably due to contamination with the microorganisms from the aquatic environment. Cross-contamination during marketing could have also occurred. The *Salmonella* serotypes found in blood cockle samples were *Salmonella agona*, *Salmonella Corvallis*, *Salmonella mikawasima* and *Salmonella tennessee*. *Salmonella corvallis*, *Salmonella pomona*, *Salmonella typhimurii*. *Salmonella weltevreden* were the serotypes identified in carpet clams. From the antibiotic susceptibility test, 28.6% of the *Salmonella* isolates from cockles were resistant to ampicillin, 14.3% to chloramphenicol and 42.9% to compound sulfonamides. For carpet clams, 11.1% of the *Salmonella* isolates were resistant to ampicillin and amoxicillin/clavulanic acid. Contamination with antibiotic resistant *Salmonella* and occurrence of antibiotics in aquatic environment may have resulted in the occurrence of antibiotic resistant *Salmonella* in bivalves. The presence of *Salmonella* and *Arcobacter* in these edible bivalves is of public health importance.

Keywords: *Campylobacter* spp., *Arcobacter* spp., *Salmonella* spp., blood cockle, carpet clam, antibiotic resistance

Determination of LD₅₀ in Genetically-Improved Farm Tilapia (*Oreochromis spp.*) against *Streptococcus agalactiae*

Liaw Shu Lan, ¹Md Sabri Mohd Yusof & ²Siti Zahrah Abdullah

¹Department of Veterinary Pathology and Microbiology

Faculty of Veterinary Medicine, Universiti Putra Malaysia

²National Fish Health Research Center (NaFisH), Penang, Malaysia

Abstract

Streptococcus agalactiae causes significant morbidity and mortality among a variety of freshwater and saltwater fish species throughout the world. It is an important emerging pathogen in tilapia cultures. Massive fish mortality due to the infection by this organism was first observed in Sungai Pahang Malaysia in 1997, affecting tilapia weighed 300 to 400 g kept in floating net cages. In this study, the LD₅₀ was determined by challenging the genetically-improved farm tilapia (GIFT) (weighing approximately 100 to 150 g) with three different doses of *S. agalactiae* (1.06×10^8 , 1.06×10^7 and 1.06×10^6 CFU/mL) using three different methods: intraperitoneal injection (Group 1), immersion for 30 min (Group 2) and immersion for 90 min (Group 3). Group 4 served as a control. The fish were observed daily for signs of *S. agalactiae* infection. After day 14, the remaining fish were humanely killed. The affected fish showed neurologic signs and typical streptococcosis lesions, involving the eye, operculum, body, fin and internal organs. The results showed, significantly ($p < 0.05$) higher mortality occurred at dilution 10^8 (30%) than dilution 10^6 (2%). However, dilution 10^7 produced 20% mortality which was not significantly different from dilution 10^8 or 10^6 . Intraperitoneal injection (30% mortality) did not differ significantly from immersion for 30 min (12% mortality) or immersion for 90 min (24% mortality). The LD₅₀ for intraperitoneal injection, immersion for 30 min and immersion for 90 min were 6.31×10^7 , 1.00×10^8 and 7.36×10^7 , respectively. The intraperitoneal injection (92.6%) revealed the highest percentage of bacteria isolation followed by immersion for 30 min (66%) and immersion for 90 min (50%).

Keywords: *Streptococcus agalactiae*, GIFT, LD₅₀

***In Vitro* Studies of Ginger (*Zingiber officinale*) as Alternative Anthelmintic against *Haemonchus contortus* L3 Stage**

Amir Husin Abd Rani, ¹Arifah Abdul Kadir,

²Rehana Abdullah Sani & ³M. Murugaiyah

¹Department of Veterinary Preclinical Sciences

²Department of Veterinary Pathology and Microbiology

³Department of Veterinary Clinical Studies

Universiti Putra Malaysia

Abstract

Helminthiasis is a major threat to small ruminant production leading to enormous economic losses. *Haemonchus contortus* is a highly pathogenic parasite of small ruminants, and is capable of causing acute disease and high mortality in all classes of stock. Commercial anthelmintics have been used for several decades throughout the world to minimize the losses caused by helminth infections. However, the threats of anthelmintic resistance, risk of residue, availability and high cost especially to farmers of low income in developing countries have led to the need for other alternative control methods. Ginger (*Zingiber officinale*) as an alternative anthelmintic, employed *in vitro* to target the infective larvae. One milliliter of the extract at concentrations of 0.5 mg/mL, 0.1 mg/mL, 0.05 mg/mL, 0.025 mg/mL and 0.0125mg/mL was added to the active L3 of *Haemonchus contortus*. There were six replicates for each concentration and mortality index was calculated based on observation at 0, 2, 4, 6 and 24 h post-treatment. The results of this study showed that ginger extract increased the mortality index of L3 *H. contortus* after exposure, and the efficacy increased with time and concentration. The ginger extract exhibited anthelmintic activity more prominently at the highest concentration (0.5 mg/mL) where the mortality index was 99% after 24 h post-treatment. Each concentration of ginger extract showed significant ($P<0.05$) anthelmintic activity as early as 2 h of treatment. Ginger extract showed a time-dependant anthelmintic activity where the longer the exposure of L3 *H. contortus* larvae to extract the higher the mortality index. It is concluded that the ginger extract has potential as anthelmintic against L3 stage larvae of *H. contortus*.

Keywords: *Haemonchus contortus*, *Zingiber officinale*, *in vitro*

Microbiological Quality of Frog Meat

Ummi Noorhakimah Abdullah, ¹Latiffah Hassan & ¹Saleha Abdul Aziz

*¹Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Frog meat is considered a delicacy for many communities in the world. It is very popular among the Chinese Malaysian who consumes the meat for its presumed medicinal values. However the microbiological safety of the meat has never been evaluated. The aim of the present study was to detect common foodborne pathogens and to enumerate the indicator organisms in the meat. Thirty frogs were purchased from two wet markets in Selangor. From each market, three retailers were sampled and from each retailer, five frogs were purchased. The wet markets chosen for the present study were Setapak Wet Market and Chow Kit Road Wet Market. Standard Plate Count (SPC), Coliform Plate Count (CPC) and detection of *E. coli* and *Salmonella* were performed using the established methods. Generally, frog meats from both markets have a high level of coliform counts. High level of coliform count may suggest inadequacy of hygiene during processing of frogs meat or faecal contamination during the process. The CPC counts from meat purchased at Chow Kit Road market were higher than those from Setapak market. *E. coli* and *Salmonella spp.* were detected at low levels from the frog meats sold at both wet markets.

Keywords: frog meat, foodborne pathogens, microbiological quality

Analgesic Effect of Tramadol and Tolfenamic Acid in Post-ovariohysterectomized Cats

Tan Yian Ming & ¹Chen Hui Cheng & ²Nor-Alimah Rahman

¹Department of Veterinary Clinical Studies

²University Veterinary Hospital

Faculty of Veterinary Medicine, Universiti Putra Malaysia

Abstract

Analgesic effect of tramadol and tolfenamic acid in ovariohysterectomized cats were compared in this controlled, randomised and blinded study. Fourteen cats that underwent ovariohysterectomy were randomly assigned to two treatment groups. Group A received tolfenamic acid (4 mg/kg, SQ) at extubation and 24 h after surgery. Group B received tramadol (3 mg/kg, SQ) during premedication and 10 h after surgery. The post-operative analgesia was assessed by a blinded assessor using subjective and objective pain assessment methods. Assessment was made before and at 1, 2, 4, 6, 8, 10, 12, 16, 22, 24, 26, 28, 36 and 48 h after the surgery. Blood samples were taken before surgery and at 48 h after surgery for biochemistry evaluation. Faecal occult blood test was performed before, and at 24 and 48 h after surgery. Visual analog scale for pain in tramadol group was lower than tolfenamic acid at 4 and 8 h. Tramadol group were more responsive than tolfenamic acid group at 4 h. There was no treatment difference in mechanical pressure threshold (MPT). All post-operative MPT values were lower than baseline and did not return to the baseline values even after the second dose of tramadol or tolfenamic acid. There were no changes in blood biochemistry at 48 h in either group. None of the cats required intervention analgesia. In conclusion, preemptive use of 3 mg/kg tramadol provided better analgesia to cats for up to 8 h post-ovariohysterectomy compared to tolfenamic acid.

Keywords: tramadol, tolfenamic acid, ovariohysterectomy, cat, pain

Effect of Selenium Supplementation on the Spermatogenic Cells of Goats

**Amelia Choong Khai Lin, ¹Shanthi Ganabadi,
²Mohamad Hilmi Abdullah & ²Halimatun Yaakub**

¹Department of Veterinary Preclinical Sciences, Faculty of Veterinary Medicine

*²Department of Animal Science, Faculty of Agriculture
Universiti Putra Malaysia*

Abstract

Selenium is an essential trace mineral that is required for many physiological functions in animals. The potential relevance of selenium to the reproductive system of livestock has been considered by many researchers. The objective of this study was to determine the effect of selenium supplementation on the spermatogenic cells of goats. Eight young male local crossbred (Katjang x Boer) goats, aged between 9 to 11 mo, were used in this study. The control group (n = 4) was fed with a diet consisting of 60% Guinea grass and 40% concentrates while the treatment group (n = 4) was fed with the same diet as the control group but with supplementation of 0.6 mg selenium (sodium selenite powder) per day for each goat. The diets were given for 100 d and the goats slaughtered on the 101 st d. The testes were removed from the carcasses of the goat and the histological slides prepared from the middle parts of the testes. The number and percentage of the spermatogenic cells of the seminiferous tubules were obtained and compared between control goats and the selenium-supplemented goats. There were no significant differences ($p > 0.05$) in the means (for spermatogonium, spermatocytes, spermatids, spermatozoa and the total number of spermatogenic cells) for the two treatments. However, significant differences ($p < 0.05$) were noted for the mean percentages of spermatids and spermatozoa between control goats and the selenium-supplemented goats. Selenium supplementation increased the percentages of spermatids but decreased the percentages of spermatozoa in the seminiferous tubules.

Keywords: goats, spermatogenic cells, selenium supplementation

Comparison between Automated and Manual Differential WBC Counts of Canine Blood at Different Storage Times

**Ong Hoi San, ¹Nadzariah Cheng Abdullah, ²Hazilawati Hamzah
& ²Noordin Mohamed Mustapha**

¹Department of Veterinary Clinical Studies

*²Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

In routine clinical examination, blood is usually sent for Complete Blood Count (CBC) to evaluate changes in cell numbers. Traditionally, these counts are done by manual evaluation. However, with advances in technology of clinical pathology, various automated hemoanalysers for veterinary use are now available. The availability of these machines allow veterinarian to conduct rapid blood analysis and enhance their practice. The reliability of a 5-part differential veterinary haemoanalyser, CELL DYN® 3700, was compared with manual differential count at different blood storage times, and also to a 3-part haemoanalyser, the Vet ABC. Fifty-four dogs were selected through simple random sampling. Blood samples were obtained and analysed immediately using the automated cell-counters. Blood smears were made for all samples for manual differential counts. The samples were then kept at 4°C and 15 samples at each time interval again analysed at 24, 48 and 72 h. Pearson's correlation analysis between automated and manual differential counts showed that fresh blood samples from dogs with normal leukocyte numbers had a poor to good correlation for band neutrophils, segmented neutrophils and lymphocytes. Monocytes and basophils were not correlated. The differential WBC counts for fresh blood samples obtained from dogs with leukocytosis generated by the automated machine did not correlate with the manual counts, although band neutrophils showed an awkward comparable result. Results for differential WBC counts at different storage times from both methods revealed that there were no significant difference for band and segmented neutrophils, eosinophils and basophils. Monocyte and lymphocyte counts were significantly different, although the values were within the reference range. Comparison of correlation coefficient for total RBC, WBC and platelet counts, Hb, HCT, MCV and MCHC between the 5- and 3-part haemoanalysers showed that all parameters had strong correlation except for MCHC. In conclusion, the automated differential counts, obtained from CELL DYN® 3700, showed good comparability with manual differential counts for dogs with normal leukocyte numbers. However, the count must be accompanied by microscopic examination of the blood smear for morphologic changes of the leukocytes.

Keywords: canine blood, automated and manual differential WBC counts, storage time intervals

Methicillin Resistant *Staphylococcus aureus* in Raw Chicken Meat in the Klang Valley, Malaysia

Mohammad Fhitri Shari & ¹Zunita Zakaria

*¹Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Methicillin resistant *Staphylococcus aureus* (MRSA) is considered the most important pathogen within the gram-positive cocci because of its resistance to many types of antibiotics. In this study, 30 chicken meat samples were obtained from wet markets in the Klang Valley, Malaysia. The samples were processed for the isolation of *S. aureus* and MRSA by plating onto Blood Agar (BA) and Mannitol Salt Agar (MSA), gram-staining, catalase and coagulase test. Confirmation of the identity of MRSA was done using ORSAB selective media (OXOID) in which MRSA forms dark blue colonies. Staph ident kit (OXOID) was used to reconfirm the identity of the *S. aureus*. Antibiotic sensitivity test was done for all MRSAs to determine the antibiogram of the isolates towards methicillin, erythromycin, bacitracin, vancomycin, ceftiofur and ampicillin. Twenty *S. aureus* isolates were obtained from the samples and 20 isolates (60%) were identified as MRSA. Among the MRSA isolates, 11 (91.67%) were multidrug resistant. This study demonstrated the MRSA contamination in chicken meat suggesting that there is a risk of acquiring MRSA through handling raw chicken meat.

Keywords: methicillin resistant *Staphylococcus aureus* (MRSA), *Staphylococcus aureus*, chicken meat, multidrug resistant.

Occurrence of Bacteria in Fresh and Frozen Semen of Bulls

Norsharina Arshat, ¹Rosnina Mohd Yusoff & ²Saleha Abdul Aziz

¹*Department of Veterinary Clinical Studies*

²*Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

The semen of bulls, although free from specific pathogenic organisms, may become contaminated with bacteria. Bacteria can contaminate the semen during collection, processing and preservation stages. The presence of opportunistic pathogens may compete with spermatozoa for nutrients, and may cause reproductive disorders when used. This study was undertaken to determine the presence of bacteria in frozen and fresh bull semen and also to determine the type of bacteria present if any. Fifteen bulls were randomly chosen from the Taman Pertanian Universiti, Universiti Putra Malaysia, for fresh semen collection and 15 frozen semen straws of different years of cryopreservation were obtained from The National Institute of Veterinary Biotechnology (IBVK), in Jerantut, Pahang. Fresh semen samples were collected by using an electroejaculator. The samples were cultured onto blood agar, MacConkey's agar and *Campylobacter* Cefoperazone Deoxychocolate Agar (CCDA). All fresh semen samples were positive for bacterial growth. The predominant type of bacteria isolated was staphylococci, followed by *Corynebacterium* spp., and *Stenotrophomonas malthophilia*. Five frozen semen straws were positive for bacterial growth with the predominant type of bacteria being *Stenotrophomonas malthophilia*. However, *Campylobacter fetus* was not isolated from both fresh and frozen semen.

Keywords: semen, bull, bacteria

Gross and Histological Changes of Specific Pathogen Free Embryonated Chicken Eggs Infected with Avian Reovirus via Different Routes of Inoculation

Nik Mohd Faiz Mohd Azmi & ¹Mohd Hair Bejo

*¹Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Avian reoviruses have been recovered from chickens with several disease manifestations, the most important of which appears to be tenosynovitis or viral arthritis. It was the objective of the study to determine the gross and histological changes of specific pathogen free (SPF) embryonated chicken eggs infected with avian reovirus via different routes of inoculation. Five 36-day-old broiler chickens were brought for necropsy with complaint of carcass condemnation due to swollen hock joint. Gross and histological examinations showed typical lesions of viral arthritis or tenosynovitis. The tissues of joint from the chicken were processed and inoculated into 9-day-old SPF embryonated chicken eggs through chorioallantoic membrane (CAM) route for isolation and propagation of the virus. The isolate was successfully propagated up to passage 5 with 100% mortality recorded from each passage. The virus inoculum of passage 4 with a titer of $10^{6.5}$ EID₅₀/0.1mL was inoculated (0.1 mL) into 9-day-old SPF embryonated chicken eggs either via CAM, allantoic sac (AL) or yolk sac (YS) routes. The controls were uninoculated eggs. The study showed that CAM and YS groups produced 100% mortality with CAM group producing early mortality at day 2 postinoculation (pi), while the YS at day 4 pi. The AL group only reached peak mortality of 62% throughout the trial. Groups CAM, YS and AL produced similar gross and histological lesions at day 6 pi, while only groups CAM and YS produced lesions at day 3 pi. Gross lesions shown were congestion and hemorrhages of the embryo, including the hock joint. Histologically, the lesions observed were infiltration of lymphocytes, hemorrhages and congestion of CAM and joint tissues. This experiment suggests that CAM is the best route of inoculation followed by YS. Allantoic cavity is not recommended because it does not produce satisfactory result.

Keywords: specific pathogen free embryonated chicken egg, viral arthritis, chorioallantoic membrane, allantoic cavity, yolk sac

Prevalence and Diagnosis of Blood Parasites in Dogs in the Klang Valley, Malaysia

Gerry Yeoh Wen Han, ¹Rehana Abdullah Sani,

¹Hazilawati Hamzah & ²Yeoh Eng Cheong

¹Department of Veterinary Pathology and Microbiology

Faculty of Veterinary Medicine, Universiti Putra Malaysia

²Yeoh Veterinary Clinic and Surgery, Petaling Jaya, Malaysia

Abstract

This study was carried out to determine the prevalence of blood parasites in dogs from Klang valley namely Kuala Lumpur, Petaling Jaya and Puchong and to compare the detection method using various stains. Fifty-five strays were sampled from a dog pound in Kuala Lumpur and 91 owned dogs from two private clinics in Petaling Jaya and Puchong, Malaysia. Three thin blood films were made from ear tip pricks of each dog and stained with QuickDiff™, ‘RapidDiff’ and Giemsa for comparison of stains. The blood parasites detected and their prevalence rates were as follows; *Babesia canis* (3.43%), *Ehrlichia canis* (2.74%), *Hepatozoon canis* (2.74%), *Babesia gibsoni* (1.37%), *Brugia malayi* (0.68%) and *Dirofilaria immitis* (0.68%). No significant difference ($P < 0.05$) was found for the prevalence of blood parasites between strays and owned dogs. DiffQuick™ stain revealed a very good agreement ($k=1.00$) compared to Giemsa stain for each blood parasite in this study, ‘RapidDiff’ stain also had very good agreement ($k=1.00$) compared to Giemsa for each of the blood parasite except *B. gibsoni* that only showed moderate agreement ($k=0.079$). The findings suggest that both DiffQuick™ and ‘RapidDiff’ could be used interchangeably with the gold standard Giemsa in the detection of blood parasites namely *Babesia canis*, *Babesia gibsoni*, *Ehrlichia canis*, *Hepatozoon canis*, *Dirofilaria immitis* and *Brugia malayi*.

Keywords: blood parasites, dogs, Klang valley, stains

Effects of Road Transportation on Physiological Stress Responses and Heat Shock Protein 70 Expression in Boer Goats

Cheah Yuen Wai, ¹Mohamed Ali Rajion, ²Zulkifli Idrus & ¹Goh Yong Meng

¹Department of Veterinary Preclinical Sciences, Faculty of Veterinary Medicine

²Department of Animal Science, Faculty of Agriculture

Universiti Putra Malaysia

Abstract

A study was conducted to determine the physiological stress responses and heat shock protein 70 (HSP70) expression in Boer does undergoing transportation under different stocking densities. A total of 60 Boer does weighing 19.5±3.5 kg were used in this study. The does (n=20 per treatment group) were allocated to one of three treatments namely; control, low density (0.4 m² floor space per animal) and high density (0.2 m² floor space per animal). Does kept under normal conditions served as controls. The does were transported in a 3-tonne partially-open truck on two different days under different floor space allowances. The ambient temperatures during transportation were between 30 and 32°C. Rectal temperatures and blood samples were obtained from the controls in the farm and the transported groups upon arrival. Blood smears were prepared to determine the neutrophil to lymphocyte (N:L) ratios and serum was used to determine cortisol concentrations by standard radioimmunoassay (RIA) techniques. The heart and kidneys of five slaughtered goats from each treatment group were harvested and frozen in liquid nitrogen for the determination of HSP70 densities using the Western blotting technique. The rectal temperatures (P<0.05) and serum cortisol concentrations (P<0.05) were significantly higher in the transported animals than in controls. However, the values of these parameters for the transported animals at different floor spaces were similar, indicating that the stocking density employed during transportation did not influence both stress parameters. The N:L ratios for the transported goats were significantly higher (P<0.05) than those of the controls and the smaller floor space resulted in greater stress (P<0.05). The amounts of HSP70 were significantly (P<0.05) higher in the heart tissues of high density transported group than the control with no difference (P>0.05) in HSP70 concentrations between animals transported under low density from either the control or high density transported group. On the other hand, the amounts of HSP70 in kidney tissues of the high density transported group were significantly higher (P<0.05) than the low density group which in turn were significantly higher (P<0.05) than the controls. The results of this study clearly demonstrated that transportation produces significant stress responses in Boer goats. The stress signs included increased rectal temperatures, N:L ratios, serum cortisol concentrations and HSP70 expression, the latter showing different expressions in different tissues. Our study also showed that animals transported under higher densities mostly exhibited greater stress responses than those transported at low densities.

Keywords: boer goats, transportation, stocking densities, stress, physiological stress responses, heat shock protein 70 (HSP70)

Physiological and Behavioural Responses to Road Transportation and Translocation in the Red Junglefowl (*Gallus gallus spadiceus*) and Commercial Broiler Chickens

Azalea Hani Othman, ¹Shaik Mohamed Amin Babjee & ²Zulkifli Idrus

¹Department of Veterinary Pathology and Microbiology, Faculty of Veterinary Medicine

*²Department of Animal Science, Faculty of Agriculture,
Universiti Putra Malaysia*

Abstract

Transportation and translocation play major roles in poultry industry and have been associated with exposure to numerous potential stressors. While, there is substantial work done on commercial broilers (CB) and laying hens, there is no documented work on the effect of transportation and translocation in the Red Junglefowl (RJF). In this study, the physiological and behavioral responses to road transportation and translocation were investigated in the RJF and CB. Twenty 4-month-old female RJF and 20 5-weeks-old female commercial broiler chickens were used in this study. They were subjected to 1 h transportation from a small farm in Jenderam Hilir, Selangor to Universiti Putra Malaysia and housed in battery cages. Blood samples were taken at 0 h (before transportation), 1, 48, 96 and 168 h post-transportation for the determination of heterophil to lymphocyte (H:L) ratios and plasma corticosterone concentrations (CORT). Transportation elevated the H:L ratio but not the CORT in both the RJF and CB. The H:L ratio of both genotypes declined at 48 h post-transportation and translocation. The CB showed significantly ($p < 0.05$) higher CORT than RJF at 1, 48 and 96 h. Translocation to a novel environment resulted in higher frequency of pacing and standing in the RJF but not in the CB. However, by day 3, the RJF spent less time pacing. The percentage of birds preening, a comfort behavior, was significantly higher in CB than RJF.

Keywords: red junglefowl, H:L ratio, plasma corticosterone, pacing, preening

Isolation, Propagation and Infectivity of Fowl Adenovirus of Malaysian Isolate in Specific Pathogen Free Embryonated Chicken Eggs

Mohd Faizal Ghazali & ¹Mohd Hair Bejo

*¹Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Inclusion body hepatitis (IBH) is a disease caused by fowl adenovirus (FAdV) characterized by sudden onset of mortality in broilers. Several outbreaks of IBH were reported in the region recently. Both liver and the chorioallantoic membrane (CAM) samples have been claimed to show successful rates of virus infectivity. It was the objective of the study to determine the most suitable sample for FAdV inoculation in specific pathogen free (SPF) embryonated chicken eggs either using CAM or liver sample. Seventy-two 9-day-old SPF embryonated chicken eggs were used to inoculate FAdV isolated from the liver samples of IBH field outbreak in a broiler farm in Selangor. The chickens showed typical gross lesions of diffused hepatitis and the presence of intranuclear inclusion bodies in the liver. The eggs were divided into two groups, namely the Mortality group consisting of 24 eggs and the Sacrifice group consisting of 48 eggs. All embryonated eggs in each group were equally subdivided into three subgroups which were the liver, the CAM and the control groups. The embryonated eggs acted as the Control group. The embryonated eggs were inoculated via CAM with 0.1 mL FAdV of Malaysian isolate derived from either prepared liver of CAM sample inoculums. Another group of the embryonated eggs acted as the Control group. The embryos in the Mortality group were observed for mortality pattern and the time of mortality was recorded. The embryos in the Sacrifice group were sacrificed on days 3, 6, 9 and 12 postinoculation (pi) to assess the lesion development and sampled for histological examination. The virus was propagated twice in embryonated chicken eggs via CAM route with the liver and CAM sample inoculums via CAM route. The study showed that the embryos inoculated with the liver sample inoculums were hemorrhagic, congested with slightly thickened CAM. While the embryos inoculated with CAM samples inoculums became dwarfed, hemorrhagic and congested with markedly cloudy and thickened CAM. The embryos from all the groups were bilateral enlarged with pale to jaundice liver. Both groups had reached 100% mortality by day 4 pi although embryonic death (12.5%) was first recorded as early as day 2 pi in the eggs inoculated with the liver inoculums. Histologically, both groups showed numerous intranuclear inclusion bodies in the hepatocytes. It was concluded that the liver sample inoculums is better than the CAM sample inoculums in the isolation and propagation of avian adenovirus.

Keywords: fowl adenovirus (FAdV), specific pathogen free (SPF) embryonated chicken eggs, inclusion body hepatitis (IBH), intranuclear inclusion body.

Occurrence of Antibiotic Resistant *Escherichia coli* and *Salmonella* Spp. in Dogs and Cats

Loke Yuen Ang & ¹Saleha Abdul Aziz

*¹Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Pet owners are now more concerned about animal welfare. Thus there is an increasing trend in expenditure for veterinary care and usage of antimicrobial agents as chemotherapy and prophylaxis in surgical and non-surgical patients. The objectives of this study were to determine the occurrence of *Salmonella* spp. in dogs and cats and to determine the antimicrobial resistance pattern in *Escherichia coli* and *Salmonella* spp. isolates against ampicillin, cephalothin, compound sulphonamides, chloramphenicol, and enrofloxacin. Eighty-two rectal swab samples from dogs and cats were collected from veterinary clinics (28), dog kennels (15), catteries (9), and individual owners (30) in Malaysia. Only one sample (1.3%) from a veterinary clinic was positive for *Salmonella* spp. This isolate showed multidrug resistance to all tested antibiotics except toward enrofloxacin. Of 72 *Escherichia coli* isolated, 26 (36.1%) were resistant to one or more antibiotics. Ten isolates (38.5%) showed multidrug resistance while 7 (26.9%) showed resistant to one type of antibiotic only. The isolates showed nine different antibiotic resistant patterns. The highest resistant rate was towards ampicillin (29.2%) followed by compound sulphonamides (26.4%), chloramphenicol (15.3%), enrofloxacin (11.1%) and lastly cephalothin (1.4%). This is expected since broad-spectrum antibiotics were the main choice in treating bacterial infections in small animal practices. However, the resistant to enrofloxacin in this study was much higher than that observe in other countries. Emergence of multidrug resistance organisms could be due to overuse or misuse of antibiotics and through nosocomial infection.

Keywords: dogs, cats, *Escherichia coli*, *Salmonella* spp., antibiotic resistant

Changes in Blood Parameters of Endurance Horses with Metabolic Crisis

**Muhammad Munsiff Kamarudin, ¹Bashir Ahmad,
Noraniza Mohd Adzahan & ²Rasedee Abdullah**

¹Department of Veterinary Clinical Studies

*²Department of Veterinary Pathology and Microbiology
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

In endurance, metabolic condition is one of the main criteria for elimination. However in cases associated with metabolic crisis, serious complications may occur, which could even lead to death. It is therefore important to understand the systemic changes in blood parameters to prevent further complications during metabolic crisis. Twelve horses that were eliminated from an endurance race due to metabolic crisis were used in this study. During clinical examination the color of mucous membrane, capillary refill time, skin recoil, gastrointestinal sounds, muscle tone, heart rate and cardiac recovery index were observed and graded. Blood parameters determined were packed cell volume, plasma protein, sodium, potassium, chloride, aspartate transaminase (AST) and creatinine kinase (CK) concentrations. The study showed that most of the horses were eliminated based on changes in a combination of metabolic parameters. The most common parameters that lead to elimination were increased heart rate, increase cardiac recovery index and the absent or decreased gastrointestinal sounds. The horses also showed varying degrees of dehydration as indicated by changes in mucous membrane, capillary refill time, skin recoil, increase of packed cell volume and total plasma protein. The most consistent findings in metabolic crisis in these horses were elevated plasma CK and AST.

Keywords: metabolic crisis, cardiac recovery index, heart rate, gastrointestinal sounds, AST, CK

***In Vitro* Anthelmintic Efficacy of Bitter Gourd (*Momordica charantia*) Whole Fruit Extract Against *Haemonchus contortus* Infective Stage Larvae**

R. Pravina Vathi & ¹M. Murugaiyah

*¹Department of Veterinary Clinical Studies
Faculty of Veterinary Medicine, Universiti Putra Malaysia,*

Abstract

Helminth infection is a major cause for reduced productivity in all classes of livestock. A wide variety of chemical anthelmintics are being used for the prophylaxis and treatment of helminths. The usage of common chemical anthelmintics, has lead to the development of resistance in helminths and because of that various plants have been studied for potential anthelmintic properties. There are now great demands for herbal products as an alternative to chemical anthelmintics. An *in vitro* study was conducted to determine the efficacy of bitter gourd (*Momordica charantia*) whole fruit extract against *Haemonchus contortus* infective stage larvae (L3). *Momordica charantia* extract was obtained by methanol extraction. Five different concentration of the extract were studied for its efficacy against *Haemonchus contortus* L3. The effect of the extract on the mortality of L3 were highly significant ($p < 0.05$) and the most effective concentration was 0.1mg/mL. At this concentration, 100% of the L3 were killed within 6 h posttreatment. *Momordica charantia* extract exhibited a dose-dependent anthelmintic activity and seems to be as effective as Albendazole. Thus, *Momordica charantia* extract can be considered as an alternative to chemical anthelmintics to overcome threats of anthelmintic resistance.

Keywords: anthelmintic; *Momordica charantia*; *Haemonchus contortus*

Efficacy of Lactic Acid Bacteria as Probiotics in *Clarias Sp.*

Dian Najibah Abu Talib & ¹Hassan Hj. Mohd Daud

¹Department of Veterinary Clinical Studies

Faculty of Veterinary Medicine, Universiti Putra Malaysia

Abstract

A study was carried out to investigate the efficacy of lactic acid bacteria (LAB) as probiotic in catfish fries (*Clarias sp.*). Lactic acid bacteria was investigated to determine if it can provide better growth performance and as an anti-microbial agent. A total of 100 catfish fries were used. Twenty catfish fries, approximately 1 week old, were randomly divided in five groups and labeled as Group 1 to Group 5. Group 1 and Group 2 were the controls which were given sodium chloride and Peptone Water. Group 3 to Group 5 were the treatment groups and were given LAB, yeast and a mixture of LAB and yeast preparations, respectively. These preparations were mixed with commercial feed. The commercial feed was fixed at 4% of the average body weight per day per fish and given once daily. At the end of the feeding trial of 14 d, the fish were weighed and measured. Results revealed that there was significant effect in the treatment groups on day 14. There was also a significant result to the standard body length. To see the effect of LAB as anti-microbial agent, a cross-streaked experiment was done. Results revealed that there was no growth inhibition of *Aeromonas hydrophila* and *Pseudomonas aeruginosa*. Qualitative and quantitative study of the gut microflora profile showed all the fry had LAB in its gut and Gram negative bacteria was not evidenced in it. The LAB is not pathogenic to the catfish fry as the highest cumulative mortality was only 10% in Group 3 and 4. For the gut development, there were no significant difference between the treatment groups in the length of the villi after 14 d.

Keywords: catfish fries, probiotic, lactic acid bacteria, antimicrobial effects, gut development

Morphological Features of the Red Jungle Fowl (*Gallus gallus spadiceus*) and its Domestic Crosses

**Salehatul Khuzaimah Mohamad Ali, ¹Shaik Mohamed Amin Babjee
& ²Halimatun Yaakob**

¹*Department of Veterinary Pathology and Microbiology, Faculty of Veterinary Medicine*

²*Department of Animal Science, Faculty of Agriculture
Universiti Putra Malaysia*

Abstract

Most people including villagers are confused about the distinctions between the pure Red Junglefowl, their crossbreds and even the village chicken. Cross-bred Red Junglefowls are kept by many villagers and these birds are not obviously different in appearance from the pure Red Junglefowl especially to the untrained eyes. In this study, 16 male freshly caught wild Red Junglefowls, 16 high-cross and 10 low-cross Red Junglefowls were used to study their external morphology and differences between the three groups, and the subspecies found in Malaysia. The body shape, colouration of the plumage, iris, bill, combs, lappets, earlobes, neck and rump feathers, legs and measurements including the bodyweight, body length, bill length, comb, lappets, and earlobe size, wing span, wing length, wing breadth, shank length and cross-sectional area, spur length and length of the individual neck and rump hackle feathers were observed, measured and described. From the morphological characteristics, the Malaysian Red Junglefowl under study still has all the morphological characters of the pure Red Junglefowl previously described. It is believed that the pure Red Junglefowl is still in existence in the remote areas of Peninsular Malaysia. The Red Junglefowl crosses can be differentiated by their body shape, leg color, thickness and size of comb and lappets, lappets orientation, lesser sickles number and pattern, and crow pattern. Based on features described in early studies, the subspecies of Red Junglefowl in Malaysia was found to be the *Gallus gallus spadiceus*.

Keywords: red junglefowl, *Gallus gallus spadiceus*, external morphology,

A Retrospective Study on the Injuries of the Superficial Digital Flexor Tendon in Thoroughbred Racehorses

**Dasarathurao Seeta Ramaiah, ¹Noraniza Mohd Adzahan,
²Goh Yong Meng & ³Shri Kanth**

¹Department of Veterinary Clinical Studies

²Department of Veterinary Preclinical Sciences

Faculty of Veterinary Medicine, Universiti Putra Malaysia

³Selangor Turf Club, Malaysia

Abstract

Overstrain injuries to the superficial digital flexor (SDF) tendon are among the most common musculoskeletal injuries contributing to considerable wasting of Thoroughbred racehorses. In this study, 87 cases of SDF tendinitis were diagnosed from 184 cases presented with lameness to the turf club veterinarian. Ultrasound was used as the diagnostic tool, and soft tissue injury (65%) on the distal limb was implicated as the cause of lameness. The majority (99%) of SDF tendinitis was in the forelimbs, with left forelimb having 4.2 times higher risk for injury than other limbs. In 5.7% of these cases, bilateral injuries were noted. The mid-metacarpal region or a point of 15 cm distal to accessory carpal bone (DACB) was the most frequent site for SDF tendinitis. The majority (47.2%) of core lesion (maximum injury zone) were centrally located in the SDF tendon. It was also noted that moderate injuries (Grade 2) had the highest percentage of cross-sectional area lesion (50.6%) on initial presentation. These data provide a valuable resource for further research into the aetiology of the tendon injury in the racehorse.

Keywords: thoroughbred racehorses, lameness, SDF tendinitis, ultrasound records