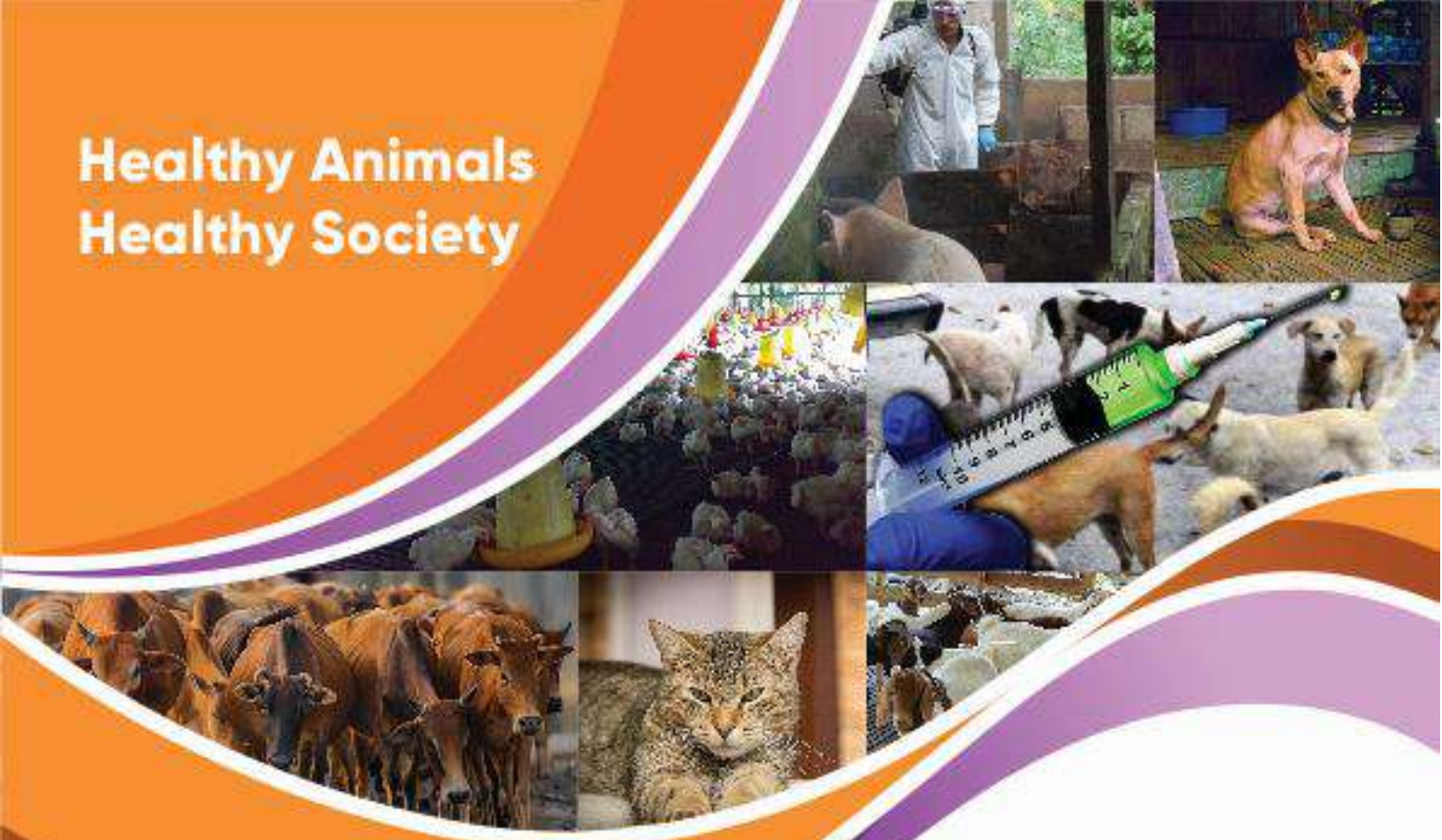
Healthy Animals
Healthy Society



Organised by:

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Department of Veterinary Services

Universiti Putra Malaysia

30th VAM CONGRESS

ANNIVERSARY CELEBRATION

30 Years Serving The Nation
United As Veterinarians

·19th - 20th October 2018·

Hilton · PJ

Message from the President, Veterinary Association Malaysia

It is with great pleasure for me to welcome all Veterinary Association Malaysia (VAM) members, participants and distinguished guests to our 30th Annual General Meeting and VAM Congress with the theme "Healthy Animals Healthy Society" which will be held from 19-20 October 2018 at PJ Hilton, Selangor.

This year has been no less challenging than the previous years for the veterinary profession – several issues have emerged, been deliberated and resolved.

Important issues being tackled includes disease occurrence like Rabies and Highly Pathogenic Avian Influenza (HPAI), antimicrobial resistance and animal welfare. The veterinary profession is very much in the limelight for their active involvement in addressing these concerns. Livestock waste management is also an important area of concern for the public at large. Hence, we are also organising a special environmental symposium that will focus on livestock waste management issues and effective methods to solve the problems.

In tackling all these issues, effective action, collaboration and cooperative efforts are required from all stakeholders, industry professionals and consumers to create a healthy symbiosis between animal-human activities and the environment in order to achieve sustainable livelihoods, human health and animal health. This is vital for the benefit of all Malaysians and our future generation.

The annual VAM Congress is indeed an excellent platform to exchange ideas, share information regarding application of veterinary and other allied sciences and also a great occasion for all members to meet and greet, make connections and to network.

I wish to thank the Department of Veterinary Services Malaysia, Chairman of the Organising Committee, committee members, VAM members, sponsors, presenters, participants and our distinguished guests, for all your support and contribution in the various activities conducted during the year.

I take this opportunity to thank the Honourable Minister of Agriculture and Agro-Based Industry and the Deputy Minister of Agriculture and Agro Based Industry for their continous support and to all our generous sponsors, VAM members and participants for attending this Congress.

Thank you.

Dato' Dr.Quaza Nizamuddin Hassan Nizam
President, Veterinary Association Malaysia 2016/2018

Welcoming note from the Chairman, 30th Veterinary Association Malaysia Congress 2018

On behalf of the Organising Committee, I take great pleasure in welcoming all members of the Veterinary Association Malaysia (VAM) to the 30th Veterinary Association Malaysia (VAM) Congress and Annual General Meeting 2018 from 19th to 20th October 2018 with the chosen theme "Healthy Animal, Healthy Society". We are indeed privileged to have the new Deputy Minister of Agriculture and Agro-based Industry, Y.B. Tuan Sim Tze Tin, as a guest of honour for the Official Opening on the 19 October 2018. VAM Congress 2018 is an appropriate platform for all Veterinarians and players of the animal industry to discuss issues, challenges and opportunities in veterinary science and animal industry development of the country. The organising committee has chartered exhilarating scientific sessions, with distinguished speakers from various institutions from all over the country to share their experiences. To date 45 oral presentation, 32 rapid oral and 50 e-posters in various veterinary discipline will be presented throughout the Congress.

I would like to thank the VAM President, its secretariat and all VAM members for their trust in me to chair this year's congress. My heartfelt gratitude goes to all of the organizing committee members for their diligence, perseverance and commitment towards the success of this congress. I truly appreciate the presence of the Deputy Minister of Agriculture and Agro-based Industry for officiating the congress.

On behalf of the organising committee I would like to express my greatest appreciation to the keynote and plenary speakers, and all presenters for their invaluable scientific contribution and to the generous sponsors for the support and contributions both in finance and in kind. I wish all of you a most fruitful and enjoyable participations in this Congress.

Thank you.

Dato' Dr. Norlizan bin Mohd. Noor
Chairman, 30th Veterinary Association Malaysia Congress 2018

30th VAM CONGRESS 2018
19th - 20th October 2018
Hilton Petaling Jaya

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Contents

Page

PREFACE xvi

KEYNOTE PAPER

1. VETERINARY SERVICES IN MALAYSIA: ITS RELEVANCE TO NATION BUILDING 1
   Quaza Nizamuddin Hassan Nizam

PLENARY PAPERS

2. ASEAN VETERINARY STATUTORY BODY NETWORK'S STRATEGIC PLANS 2018-2020, THE WAY FORWARD FOR THE REGIONAL STANDARD OF THE ASEAN VETERINARIANS. 3
   Achariya Sailasuta

3. LIVESTOCK DRINKING WATER AND WASTEWATER QUALITY STATUS IN MALAYSIA: CHALLENGES AND SOLUTIONS. 5
   Wan Lutfi Wan Johari

4. HOW GUT INFLAMMATION INFLUENCES ANIMAL PRODUCTION 6
   Danny Xue

5. EMERGING INFECTIOUS DISEASES: AVIAN INFLUENZA H5N1 AND SARS CORONAVIRUS EVOLUTIONARY TRAJECTORY IN ONE HEALTH 7
   Yeoh E.K.

SCIENTIFIC PAPERS

ORAL PRESENTATION

1. DEVELOPMENT OF LIVESTOCK IN MALAYSIA -ISSUES AND CHALLENGES 9
   Roslan Mohd Yusuf

2. PRELIMINARY STUDY ON DETERMINATION OF DRINKING WATER AND WASTEWATER QUALITY IN SELECTED DAIRY CATTLE FARMS AND ELUCIDATE THE CLINICOPATHOLOGICAL EFFECTS AND HOST CELL RESPONSES OF CONSUMING DIFFERENT QUALITIES OF DRINKING WATER AND WASTEWATER USING ANIMAL MODEL STUDY 10
   Faez Firdaus Abdullah Jesse

3. POTENTIAL OF BIOGAS PLANTS FROM LIVESTOCK WASTE DEVELOPMENT IN MALAYSIA 11
Suhaimi Dollah

4. THE ASSOCIATION OF INBREEDING COEFFICIENT AND GROWTH TRAITS OF SWAMP AND MURRAH-CROSS BUFFALOES IN SABAH 12
Mohd Shahrom Salisi

5. SEROPREVALENCE OF LEPTOSPIROSIS AND BRUCELLOSIS IN LONG-TAILED MACAQUES (MACACA FASCICULARIS) OF PENINSULAR MALAYSIA 13
Suit-B Yong, Latiffah Hassan, Siti Khairani Bejo and Reuben Sunil Kumar Sharma

6. MANAGING NECROTIC ENTERITIS IN COMMERCIAL BROILERS WITH BETTER GUT PROTECTION 14
Justin Tan

7. THE IMPACT, PREVALENCE AND MANAGEMENT OF MYCOTOXINS IN POULTRY 15
Justin Tan

8. MORTALITY RATE AND SURVIVABILITY OF CATS DIAGNOSED WITH CHRONIC KIDNEY DISEASE 16
Hemadevy Manoraj, Khor Kuan Hua

9. A CASE REPORT: FELINE DILATED CARDIOMYOPATHY 17
Jessie Bay Ji Xi, Nur Basirah Abdul Latif, Rosnadiana Rosnadir, Khor Kuan Hua

10. A PRELIMINARY STUDY ON THE STATUS OF THE POPULATION OF FREE ROAMING DOGS IN PULAU PINANG 18
Dorothy Simon, Khoo C. K., Ho H.W., Navanithakumar.B., Sohayati A.R., Tishrin M.I., Anun M., Chandrawathani P. and Quaza N.

11. THE COLLECTIVE ASSEMBLAGE OF FELINE INFECTIOUS PERITONITIS (FIP) IN CATS FROM THE FOUR-QUARTERS OF THE POST MORTEM TABLE 19
Dorothy Simon, S. Geethamalar, Khoo C. K., N. Azian, Roslina H., Roshaslinda D., Zuraida D., Norlina D., Siti Suraya H., Shafarin M.S.

12. MENINGITIS IN INFANT ORANGUTAN (PONGO PYGMAEUS) AT ORANG UTAN ISLAND, BUKIT MERAH, PERAK, MALAYSIA 20
Sabapathy Dharmalingam

13. RESPIRATORY TRACT INFECTION IN INFANT ORANGUTAN (PONGO PYGMAEUS) AT ORANG UTAN ISLAND, BUKIT MERAH, PERAK, MALAYSIA 21
Sabapathy Dharmalingam

14. SCREENING OF WEST NILE VIRUS ANTIBODY IN MACAQUE TO UNRAVEL THE STATUS OF THE DISEASE IN SELECTED AREAS IN WEST COAST MALAYSIA 22
Nur Ain Najwa Mohd Yuseri, Nor Yasmin Abd. Rahaman

15. THE EFFECT OF USEFUL MICROBES-BOKASHI ADDITION TO DIET ON WEIGHT GAINS OF RABBIT 23
Nurzillah Maliki, Muhammad Fikri K., Natashah R

16. MOLECULAR DETECTION OF INFECTIOUS BRONCHITIS VIRUS (IBV) FROM AVIAN SAMPLES IN RVLBT USING RT-PCR AND NESTED PCR 24
Thenamutha Muniandy, Sarenasulastri Ag. Besar

17. GROWTH AND FEED CONVERSION EFFICIENCY OF MALIN LAMBS IN INTENSIVE PRODUCTION SYSTEM 25
Mohd Hafiz Abdul Rahman

18. EDIBLE BIRD'S NEST: POTENTIAL REPRODUCTIVE HEALTH BENEFITS 26
Nurhusien Yimer

19. ISOLATION OF MYCOBACTERIUM AVIUM FROM EXOTIC CAPTIVE BIRDS IN PENINSULAR MALAYSIA 27
Abdul Sattar, Zunita Zakaria, Jalila Abu, Saleha Abdul Aziz

20. EFFECT OF ANTIMICROBIAL GROWTH PROMOTER AND PHYTOBIOTICS SUPPLEMENTATION ON TIBIAL BONE MORPHOMETRIC CHARACTERISTICS AND STRENGTH IN CHICKENS 28
Muhammad Abdul Basit, Arifah Abdul Kadir, Loh Teck Chwen, Saleha Abdul Aziz, Annas Salleh, Sherifat Banke Idris

21. POSITIVE DETECTION OF PLASMID MEDIATED COLISTIN RESISTANT (MCR-1) GENE IN SALMONELLA SPP. ISOLATED FROM CHICKENS 29
Roseliza Roslee

22. CHARACTERIZATION AND IN VITRO RELEASE STUDIES OF COCKLE SHELL CALCIUM CARBONATE ARAGONITE NANOPARTICLES LOADED WITH OXYTETRACYCLINE 30
Sherifat Banke Idris, Arifah Abdul Kadir, MD Zuki Abubakar @ Zakaria, Faez Firdaus Abdullah Jesse, Siti Zubaidah Ramanoon and Muhammad Abdul Basit

23. KETAMINE HYDROCHLORIDE COMBINED WITH XYLAZINE HYDROCHLORIDE IN LARGE ZOO FELINES: A 15 YEAR STUDY (1988-2003) 31
Vellayan Subramaniam, Nur Zahirah Zakaria

24. CARCINOID TUMOUR (ARGENTAFFINOMA) IN CAPTIVE BARKING DEER (Muntiacus muntjac) 32
Azman Shah, Imad Ibrahim Ali Al-Sultan, Rahmat Bin Topani, Inirah Bt. Che Ishak, Norsharina Bt. Arshat, Noor Asyikin Bt. Abu, Marsaid Bin Katiman

25. EFFECTS OF SYNCHRONISATION ON REPRODUCTIVE PERFORMANCE IN SWAMP BUFFALOES 33
Connie Tann, Abd. Wahid Haron, Hiew Wen Han Mark

26. SPINAL PATHOLOGY ASSOCIATED WITH EQUINE BACK DISORDERS: CASE REPORT 34
Abubakar Mayaki Musa, Intan-Shameha Abdul Rasak, Noraniza Mohd Azahan, Mazlina Mazlan, Akmal Mohd Noor, Noordin Mohamed Mustapha, Rasedee Abdullah

27. INVESTIGATION OF WOUND HEALING EFFECT OF Channa Striatus EXTRACT ON PERIODONTAL DISEASE IN CATS 35
Nur Zulaikha Mat Zawawi, Rumaizi Shaari, Muhammad Luqman Nordin, Tan Li Peng, Abdinasir Yusuf Osman, Ruhil Hayati Hamdan, Amirah Fatihah Dazalan, C.W. Salma C.W. Zalati

28. VIABILITY OF RECONSTITUTED NEWCASTLE DISEASE LIVE VACCINE IN DIFFERENT TEMPERATURE AND TIME POINT POST RECONSTITUTION 36
Chiun Khang Yong, Nik Mohd Faiz Bin Nik Mohd Azmi, Yan Nei Yim, Rusdam Awang

29. MARKET STRUCTURE OF LOCAL FRESH BEEF AND IMPORTED CARABEEF: A PILOT STUDY AMONG CONSUMER 37
Fazly Ann Zainalabidin, Ramlan Mohamed, Norazean Mohd Falal, Mastura Yaacob, Marni Safar, Nurul Aini Mohd Yusuf, Nurshuhada Solahudin, Sharil Azwan Mohd Zain

30. THE PERFOMANCE STUDY OF ANAEROBIC DIGESTION SYSTEM FROM DAIRY CATTLE FARM 38
Tan Teck Leon

31. EFFECT OF DRYING AND HEATING APPROACH TO THE NUTRITIONAL VALUE OF CORN IN ANIMAL FEEDSTUFF - A REVIEW 39
Mohd Azrulnizam Jaafar

32. THE IMPORTANCE OF INFECTIOUS BURSAL DISEASE (IBD) VACCINATION IN BROILERS: A CASE STUDY OF SUBCLINICAL IBD. 40
Daniel Mohan

33. MORPHOLOGICAL CHARACTERISTICS OF SHAMI GOAT IN TWO FARMS IN MALAYSIA 41
Salleh Sheikh Ibrahim, Halimatun Yaakub, Frisco Nobilly, Jothi Malar Panandam

34. COMPARISON OF FAECAL PRESERVATION AND EXTRACTION METHODS EMPLOYED IN FAECAL PROGESTAGEN ANALYSIS IN COWS 42
Innocent Damudu Peter, Abd Wahid Haron, Faez Firdaus Abdulla Jesse, Hiew Wen Han Mark, Mohd Mokrish Ajat

35. LEPTOSPIROSIS AWARENESS AMONG WORKING DOG HANDLERS IN MALAYSIA 43
Khor Kuan Hua, Rosnah Ismail, Ting Wei Liew, Seng Fong Lau, Soon Heng Goh

36. ECHOCARDIOGRAPHIC SURVEY OF THE PREVALENCE CARDIAC CONDITIONS IN DOGS IN MALAYSIA 44
Kai Sin Yap, Ibrahim Abdul-Azeez Okene, Amilan Sivagurnathan, Shanthi Ganabadi, Sivan Ayahsamy

37. SUB-ACUTE TOXICITY STUDY OF Moringa oleifera HYDROETHANOLIC LEAF EXTRACT IN ICR-MICE 45
Abdullahi Aliyu, Hazilawati Hamzah, Mohd Rosly Shaari, Noordin Mohd Mustapha, Nurul Syahirah Ahmad Sayuti, Farhan Hanif Mohd Ridwan, Shanmugavelu Sithambaram, Khozirah Shaari

38. ANTIOXIDANT AND ENDOTHELIAL PROTECTIVE EFFECTS OF EDIBLE BIRDS' NEST: A POTENTIAL SWIFT REMEDY FOR VASCULAR COMPLICATIONS IN DIABETES 46
Zuhaida Md Zain, Mohd Rais Mustafa, Dharmani Murugan, Choy Ker Woon,

39. COMPARATIVE PATHOGENICITY OF MALAYSIAN ORF VIRUSES IN MOUSE AND RAT ANIMAL MODEL 47
Jamilu Abubakar Bala, Krishnan Nair Balakrishnan, Ashwaq Ahmed Abdullah, Hassana Kyari Mangga, Faez Firdaus Abdullah Jesse, Mustapha Mohamed Noordin, Mohd Azmi Mohd Lila

40. SUBCHRONIC TOXICITY ANALYSIS OF MIXTURES OF *Mariposa christia vespertilionis* LEAF AND Morinda citrifolia FRUIT ETHANOLIC EXTRACTS IN MALE SPRAGUE DAWLEY RATS 48
Nurul Syahirah Ahmad Sayuti, Hazilawati Hamzah, Mohd Rosly Shaari, Mohd Farhan Hanif Reduan, Aliyu Abdulahi, Shanmugavelu Sithambaram, Noordin Mohamed Mustapha, Norhaizan Mohd Esa

ePOSTERS

1. SEQUENCE ANALYSIS OF S1 GENE OF ATTENUATED MALAYSIAN QX-LIKE AND VARIANT STRAINS OF INFECTIOUS BRONCHITIS VIRUSES 50
   Mohd Iswadi Ismail

2. FIRST DETECTION OF BOVINE VIRAL DIARRHEA VIRUS IN SWINE FROM MALAYSIA 51
   Nurain Izzati Saidi, Norlina Daiyan, Roshaslinda Dahlan and Roslina Hassan

3. STUDY ON BACTERIOSTATIC AND BACTERICIDAL ACTIVITY OF Piper cubeba L. EXTRACT AGAINST Escherichia coli IN RAW CHICKEN MEAT 52
   Fazly Ann Zainalabidin, Yaya Rukayadi

4. DRY MATTER YIELD AND CHEMICAL COMPOSITION OF THE WEEDS IN INTEGRATED FARMING 53
   Norlindawati Abdul Pateh

5. EFFICACY OF ANTHELMINTIC TREATMENT TO CONTROL PARASITES 54
   Sabariah Basir

6. BETTER YIELD AND NUTRITIVE VALUES OF TAIWAN NAPIER GRASS BY USING VERMICOMPOST AND COMPOST FERTILIZER 55
   Haryani Hamazah

7. NEOSPORA SPECIES INFECTION IN A HERD OF DAIRY CATTLE 56
   Nurulaini R., Azima Laili, H., Azizah, D., Adnan M., Erwanas, A.I., Debbra,M., Navanithakumar, B., Zaini, C. M., Norlaili, A.R., Sohayati,A. R.

8. WOUND HEALING ACTIVITY OF Spirulina Platensis EXTRACT ON DIABETIC RATS. 57
   Nur Aimi Syarina Pauzi, Sharida Fakurazi, Pike See Cheah, Arulselvan Palanisamy

9. NUTRITIVE VALUE OF CORN SILAGE 58
   Aswanimiyuni Arshad

10. FIRST REPORT ON IDENTIFICATION OF Pasteurella multocida serogroup F IN VETERINARY RESEARCH INSTITUTE (VRI), MALAYSIA. 59
    Evie Khoo

11. GROWTH PERFORMANCE OF CATTLE FED BY OIL PALM EMPTY FRUIT BUNCHES BASED FEEDSTUFF PRODUCE BY TWO DIFFERENCE METHOD 60
    Mohamad Noor Ibrahim

12. MICROBIOLOGICAL QUALITY OF LOCAL MILK AS ANALYSED BY REGIONAL VETERINARY LABORATORIES IN 2017 61
    Khairunnisak Mohsin, Chandrawathani Panchadcharam, Saira Banu Mohamed Rejab, Faizah Hanim Mohd Saied, Tariq Jaafar, Marzuki Zakaria

13. IKTA QUAIL POPULATION AND PRODUCTION STATUS FROM 2011 – 2018 62
Irdayu, H., Noraini, A. R., Intan Liana, M.K., Sheikh Bukhori, S. G., Nor Haidayah, J. Nur Hayati, M.Y.

14. MOLECULAR CHARACTERIZATION AND PHYLOGENETIC ANALYSIS OF INFECTIOUS BURSAL DISEASE VIRUS FROM CHICKEN IN MALAYSIA 63
S.M.Redzwan, A. S. Syamsiah, B. L. Leow, M.Y.Faizul Fikri, G.H. Ong, B., Azura, Z. Maizatul, M. R. Jihan

15. RABIES DIAGNOSTIC MANAGEMENT 64
Navanithakumar Ballakrishnan, Sohayati Abd Rahman, Rohaiza Yahaya

16. HYGIENE AND SAFETY OF MEAT FROM LOCAL ABATTOIR: A SURVEY ON PUBLIC CONCERNS 65
Nurul Syuhada Zainal Abidin

17. THE COMPARISON OF IMMUNE RESPONSE OF NEWCASTLE DISEASE VIRUS VACCINE IN SPECIFIC PATHOGEN FREE (SPF) AND VILLAGE CHICKENS 66
Niny Fariza J., Suriani M.N, Goon S.C., Abdul Jabir J., Jamaliah H., and Iswadi M.I

18. COMPARATIVE EVALUATION OF RBPT AND CFT FOR DETECTION OF BRUCELLA ANTIBODIES FROM RUMINANTS. 67
Azizah Darus

19. DEVELOPMENT OF BACILLI ID SYSTEM FOR BACILLUS SPECIES IDENTIFICATION IN VRI 68
Roseliza Roslee

20. DETECTION OF AVIAN REOVIRUS IN COMMERCIAL BROILER-BREEDER CHICKEN IN JOHOR, MALAYSIA BY REVERSE TRANSCRIPTASE POLYMERASE CHAIN REACTION 69
Mohammad Fhitri Shari

21. RETROSPECTIVE STUDY ON FOOT AND MOUTH DISEASE (FMD) POSITIVE CASES FROM 2014-2017 IN PENINSULAR MALAYSIA 70
Mohammad Bohari J., Muhammad Redzwan S., Norlida O., Ramlan M., Sohayati A.R.

22. PROX'S SYSTEM SYSTEMATIC MANAGEMENT IN BIOCHEMISTRY LABORATORY OF VETERINARY SERVICES DEPARTMENT MALAYSIA 71
Mohammad Bohari Jusoh, Sharif Saniman, Noormah Miw Abdullah, Wan Syahidah Hussain, Samijah Ahamad

23. EFFECTS OF NATURAL MATING AND ARTIFICIAL INSEMINATION ON PREGNANCY RATES IN SYNCHRONISED SWAMP BUFFALOES 72
Connie Tann, Abd. Wahid Haron, Hiew Wen Han Mark

24. RAPID AND SIMPLE APPROACH FOR IDENTIFICATION OF PASTEURELLA MULTOCIDA SEROGROUP A, B AND D BY DIRECT PCR FROM COLONY 73
Mohamad Azlan Jahaya, Noor Asyikin Abu, Tan Teck Leon, Norhidayu Abd Halim

25. A CASE REPORT OF ACUTE HAEMORRHAGIC PANCREATITIS IN BARKING DEER *(MUNTIACUS MUNTJAC)* 74
Inirah Che Ishak, Norsharina Arshat, Azman Shah Abd Manaf,
Marsaid Katiman, Rahmat Topani

26. A CASE REPORT ON THE OUTBREAK OF FOOT AND MOUTH DISEASE IN A CAPTIVE MALAYAN GAUR POPULATION 75
Leonora Tuah Merawin, Mohd Firdaus Arif Abdul Razak, Jawahir Jaafar,
Norsharina Arshat, Muhammad Idham Sahiron, Donny Yawah, Azman Shah Abd Manaf,
Rahmat Topani, Norlizan M. Noor

27. MYCOTIC ENCEPHALITIS AND PULMONARY- NEPHROMYCOSES INFECTION IN IRRAWADDY DOLPHIN- a case report 76
Aida Muhid, Norina Lokman, Noordin Mohamed Mustapha, Tamimi Mohd Ali Ahmad,
Hanafi H, Sarol Kalam

28. INCIDENCE OF LISTERIA MONOCYTOGENES IN DAIRY AND FOOD PRODUCTS OF ANIMAL ORIGIN IN CENTRAL REGION OF PENINSULAR MALAYSIA 77
Marina Abdul Rahman, Ismail Mokhtar, Nurilyana Md Taib, Mohd Fharok Yaakop,
Azzura Abdul Latif

29. PRELIMINARY STUDY ON NATURAL OCCURRENCE OF AFLATOXINS, ZEARALENONE AND FUMONISINS IN GRAIN MAIZE GROWN IN PENINSULAR MALAYSIA 78
Wan Syahidah Hussain

30. BIOGAS PRODUCTION FROM A SMALL HOLDER DAIRY FARM IN SELANGOR 79
Jamal Abdul Nasir Bin Mohamad Hassan, Yong Meng Goh,
Roslan Mohd Yusof, Teck Leon Tan

31. PREDICTION OF METABOLIC BODY WEIGHT (MBW) USING GIRTH MEASUREMENTS FOR BALI AND KEDAH-KELANTAN CATTLE. 80
Mohd Shaharizan Mohd Sham, Tan Ying Ju, Noor Aisyah Saharani,
Nik Mohamad Salmi Adli Mohd Sainian, Zaidi Salleh and Norbaizura Hashim

32. USAGE OF BIOREACTOR IN PRODUCING SALMONELLA ANTIGEN AS A SALMONELLA BIOLOGICAL CONTROL IN POULTRY 81
Muhammad Marwan Ibrahim, Dahlia Harun, Zarrahimah Zakaria, Harnita Embi, Nur Liyana Muhammad Razak

33. DIAGNOSTIC INFORMATION OF PARASITIC INFECTIONS IN VARIOUS ANIMAL SPECIES AT REGIONAL DIAGNOSTIC LABORATORY BUKIT TENGAH FROM 2015 TO 2017 82
Khor Sock Kun, Jamaiyah M.I., Maswati M.A., Saira Banu M.R.

34. MOLECULAR PREVALENCE OF BABESIA SPP. AND EHRLICHIA CANIS IN TICKS INFESTING SHELTER DOGS IN THE NORTH REGION OF PENINSULAR MALAYSIA 83
Nor-Azlina, A.A., Ain-Atiffah J., Zarith-Nabilla Z., Quincie Sipin, Malaika Watanabe, Puteri A.M. Abd Rani, Kamal F.M., Nur Mahiza M.I. and Reuben S.K. Sharma

35. COMPARISON OF BACTERIA CULTURE AND POLYMERASE CHAIN REACTION (PCR) METHODS IN IDENTIFICATION OF CORYNEBACTERIUM PSEUDOTUBERCULOSIS IN CLINICAL SAMPLES FROM GOAT 84
Nur Anis Adilah Binti Rosli, Siti Nor Binti Che Yahya

36. PET OWNERSHIP IN PUTRAJAYA 85
Mastura Yaacob, Shariffah Nazari, Muhammad Nazri Khairuddin, Sharil Azwan Mohd Zain, Fakhrulisham Razali, Chandrawathani Padchadcharam

37. LETHAL DOSE 50 TEST OF PASTEURELLA MULTOCIDA TYPE A IN MICE 86
Rohaiza Yahaya, Suriani Mohd Nor, Ho Hung wui, Lily Rozita Md Hakin, Abdul Sukor Shaharudin and Rohayu Mohd Nasir

38. EVALUATION OF HAEMORRHAGIC SEPTICAEMIA VACCINES FORMULATED WITH MONTANIDE ISA 61 VG, CORONA 8-SO-(RB), DOUBLE OIL ADJUVANT, AND ALUM 87
Hung Wui Ho, Abdul Sukor Shaharudin, Rohaiza Yahaya, Nurulaini Raimy, Norliza Abdul Wahab, Megat Abd Rani Megat Osman, Rohayu Mohd Nasir, Lily Rozita Md Hakin

39. THE EVALUATION OF CUSTOMER SATISFACTION ON SERVICES OFFERED BY KUANTAN REGIONAL VETERINARY LABORATORY 2018. 88
Rosliyani Rosslim, Faizah Hanim Mohd Saeid, Rosilawati Kamaruddin, Rohaya Mohd Ali

40. ISOLATION AND DETECTION OF EQUINE INFLUENZA VIRUS IN NASAL SWABS FROM OUTBREAK CASES IN MALAYSIA 89
Roslina, H., Nurshuhada, A.H., Zuraidah, O., Siti Suraya Hani, M.S., Roshaslinda, D., Norlina, D., M. Hasrul, A.H., Zunaida, B.

41. EDIBLE BIRD'S NEST (EBN) SUPPLEMENTATION ON COGNITIVE FUNCTION OVER TWO GENERATION MICE 90
Hafandi Ahmad, Mohd Adha P Rameli

42. IMPACT OF LAMENESS AND CLAW LESIONS ON DAIRY COW PRODUCTION AND NEED FOR APPROPRIATE PREVENTIVE MEASURES 91
Sadiq Mohammed, Siti Zubaidah Ramanoon, Rozaihan Mansor, Sharifah Salmah Syed Hussain, Wan Mastura Shaik Mossadeq

43. BLOOD PROTOZOAN INFECTIONS IN RUMINANT LIVESTOCK FROM 2011 TO 2017 – CHALLENGES IN DIAGNOSIS AND IDENTIFICATION 92
Debbra M., Chandrawathani P., Nurulaini R., Azima L., Premalatha B., Adnan M. , Erwanas A.

44. SPATIAL ANALYSIS OF HIGHLY PATHOGENIC ASIAN AVIAN INFLUENZA A (H5N1) OUTBREAK IN KELANTAN, MALAYSIA FOR THE YEAR 2017 93
Fakhrulisham Razali, Sharil Azwan Mohd Zain, Mohammad Masrin Azami, Wan Maryani Wan Hassan, Nor Liza Jelani

45. OCCURRENCE OF *CAMPYLOBACTER JEJUNI* IN CHICKENS AND ENVIRONMENT FROM ORANG ASLI VILLAGES IN SUNGAI SIPUT, PERAK, MALAYSIA 94
Mohamed-Yousif, I. M, Jalila, A[*], Saleha, A. A., Zunita, Z., and Rashid K. A.

46. HAEMATOLOGICAL AND SERUM BIOCHEMICAL PARAMETERS OF ICR-MICE IN SUB-ACUTE TOXICITY STUDY OF Clinacanthus nutans 95
Abdullahi Aliyu, Hazilawati Hamzah, Mohd Rosly Shaari, Noordin Mohd Mustapha, Nurul Syahirah Ahmad Sayuti, Farhan Hanif Mohd Ridwan, Shanmugavelu Sithambaram, Khozirah Shaari

47. EXPRESSION LEVEL OF VEGF PROTEIN IN THE EPIDERMAL KERATINOCYTES OF EXCISIONAL WOUND TREATED WITH Melastoma malabathricum LEAF EXTRACT IN SPRAGUE DAWLEY RATS 96
Farhan Hanif, M.R., Hazilawati, H., Rosly S.M., Nurul S.A.S., Aliyu, A., Noordin, M.M., Zuki, A.B.Z, Shanmugavelu, S.

48. Melastoma malabathricum LEAF EXTRACT STIMULATES HIGH EXPRESSION OF VEGF IN THE DERMAL LAYER OF SKIN DURING THE PROLIFERATIVE PHASE OF WOUND HEALING IN SPRAGUE DAWLEY RATS 97
Farhan Hanif, M.R., Hazilawati, H., Rosly S.M., Nurul S.A.S., Aliyu, A., Noordin, M.M., Zuki, A.B.Z, Shanmugavelu, S.

49. A PILOT STUDY ON MARKET STRUCTURE AND FRESH MEAT PRICES COMPARED TO FROZEN IMPORTED MEAT 98
Norazean M.F, Mastura M.Y, Fazly Ann Z, Ramlan M, Marni S, Nurul Aini M.Y, Nurshuhada S, Sharil Azwan M.Z, Norlizan M.N, Kamaliah G, Yuslan S

RAPID ORAL PRESENTATION

1. SERODETECTION OF LEPTOSPIRAL INFECTION IN STRAY DOGS IN KLANG VALLEY 100
   Soon Heng Goh, Kuan Hua Khor, Rozanaliza Radzi, Seng Fong Lau, Siti Khairani Bejo, Mohd Azri Roslan, Mohammad Sabri Abdul Rahman

2. EFFICACY OF GLYPHOSATE, AMETRYN, METSULFURON METHYL FOR CONTROLLING ELEUCINE INDICA (L.) - A REVIEW 101
   Norfadzrin Fadzil

3. DETERMINATION OF POTENTIAL VECTOR OF WEST NILE VIRUS AMONG CULEX SPP. IN WEST COAST MALAYSIA 102
   Natasha Jafar Ali, Nor Yasmin Abd Rahaman, Reuben Sunil Kumar Sharma, Nur Fazila Saulol Hamid, Nur Mahiza Md Isa

4. SEROLOGICAL TESTS FOR PARASITIC INFECTIONS IN LIVESTOCK AND PETS CONDUCTED AT THE VETERINARY RESEARCH INSTITUTE, MALAYSIA FROM 2000 TO 2015. 103
   Premaalatha Bathmanaban, Zaini Che Mamat, Zuraini Zainalabidin, Sohayati Abd Rahman, Ramlan Mohamed, Chandrawathani Panchadcharam

5. GROWTH PERFORMANCE OF BROILER CHICKEN (Gallus domesticus) USING PALM KERNEL CAKE BASED CHICKEN FEED 104
   Irdayu, H., Sharil Azwan, M.Z., Ramlan, M., Sheikh Bukhori, S. G., Nor Haidayah, J., Nur Hayati, M.Y.

6. PHENOTYPIC CHARACTERISTICS TO DIFFERENTIATE BETWEEN FEMALE OF THE RED JUNGLE FOWL, DECOY CHICKEN AND VILLAGE CHICKEN 105
   Syahar Amir A.Gani, Syazwan Saidin, Adibah Abu Bakar

7. PREVALENCE OF BLOOD PARASITES AND INTESTINAL PARASITES IN COMMERCIAL BREEDING PORCUPINES (*HYSTRIX BRACHYURA)* IN PENINSULAR MALAYSIA 106
   Ana Maria Abd. Rahim, Tuba Thabitah Abdullah Tahir, Noraisyah Ab Han, Norsharina Arshat, Ilias Mohd Rani, Millawati Abd. Ghani, Azman Shah Abd Manaf, Rahmat Topani

8. COMMON PATHOGEN DIAGNOSED IN PIG SAMPLES RECEIVED BY VETERINARY RESEARCH INSTITUTE FROM YEAR 2014 TO 2017 107
   Aisya Naama T., Chandrawathani P., Zurin Azlin M. J., Roseliza R., Roslina H., Azizah D., Nurul Fatiha A.S., Nurulaini R., Masrin A., Sohayati A.R.
9. PREVALENCE OF MRSA IN GOAT AND SHEEP MILK IN TERENGGANU 108
   Chai Min Hian

10. FIRST REPORT OF MADURELLA MYCETOMI INDUCED SYSTEMIC PULMONARY AND MYOCARDIUM MYCOSIS IN DUGONG DUGON, MERSING, JOHORE 109
    Norina Lokman

11. A STUDY ON UDDER HEALTH MANAGEMENT PRACTICES AND BULK MILK SOMATIC CELL COUNT IN DAIRY CATTLE IN FOSTER FARMS, UNIVERSITI PUTRA MALAYSIA 110
Rozaihan Mansor, Mariam Nadhirah Azlan, Sharifah Salmah Syed Hussain, Siti Zubaidah Ramanoon, Ili Liyana Kalam, Kesavan Sivagiganesan

12. FIRST REPORTED CASE OF BRUCELLOSIS IN TIMORENSIS DEER IN MUAR, JOHOR. 111
Kamini Jayarajah, Santhini Bhaskaran, Sarol Kalam, Norina Lokman, Aidi Mohamad

13. INVESTIGATION OF TETRACYCLINE ANTIMICROBIAL ACTIVITIES AGAINST *STAPHYLOCOCCUS AUREUS* FROM CLINICAL MASTITIS STRAINS IN GROWTH MEDIA AND MILK 112
Nur Syammimi Abdul Hadi, Nor Fadhilah Kamaruzzaman

14. PRELIMINARY STUDIES ON THE CONTENTS OF MAJOR MINERALS IN VARIOUS FEEDSTUFF 113
Norakmar Ismail, Suhaimi Dollah, Faridah Ismail

15. PROTECTIVE EFFICACY OF RECOMBINANT NEWCASTLE DISEASE SUBUNIT VACCINE AGAINST CHALLENGE WITH MALAYSIAN GENOTYPE VII NEWCASTLE DISEASE VIRUS. 114
Suriani Mohd Noor, Liew Mervyn Wing On, Lye Ping Ying, Niny Fariza Junoh, Abdul Jabir Jaafar, Syamsiah Aini Shohaimi, Faizul Fikri Mohd Yusop, Chin Saw Wang, Goon Swee Cheong, Jamaliah Hamid

16. DETERMINATION OF MULTI-CLASS VETERINARY DRUGS IN CHICKEN FEED BY ULTRA PERFORMANCE LIQUID CHROMATOGRAPHY TANDEM MASS SPECTROMETRY 115
Marni Sapar, Ahmad Talhah Suhaimi, Muhd Fauzi Safian

17. SERODETECTION OF LEPTOSPIROSIS IN STRAY CATS IN MALAYSIA 116
Abdul Rahman Alashraf, Seng Fong Lau, Kuan Hua Khor, Siti Khairani-Bejo, Rozanaliza Radzi

18. RETROSPECTIVE STUDY OF EQUINE COLIC CASES REPORTED TO UNIVERSITY VETERINARY HOSPITAL (UVH) FROM YEAR 2015 TO 2017 117
Nur Asyikin Haron

19. EVALUATION OF DIAGNOSTIC SENSITIVITY AND SPECIFICITY OF MELIOIDOSIS COMPLEMENT FIXATION TEST IN SHEEP AND GOAT USING 2124/01 BURKHOLDERIA PSEUDOMALLEI ANTIGEN 118
Nurul Fatiha Ahmad Shuhaimy, Rozza Nadiah Rosli, Azizah Darus

20. PRELIMINARY STUDY ON VIABILITY OF SMALL-SCALE BIOGAS PLANT DESIGN IN DAIRY FARMS IN SABAH, MALAYSIA 119
Nurshuhada Solahudin, Nurul Aini Mohd Yusof, Suhaimi Dollah

21. THE CHALLENGES FOR DEVELOPMENT OF BIOGAS PLANTS FROM ANIMAL MANURE IN MALAYSIA 120
Nurul Aini Mohd Yusof, Suhaimi Dollah, Nurshuhada Solahudin, Roslan Mohd Yusof, Norazean Mohamad Falal

22. HISTOPATHOLOGICAL AND VIRUS TISSUE DISTRIBUTION OF AVIAN REOVIRUS CLUSTER IV IN MALAYSIA 121
Norazura A. Hamid

23. A COMPARISON OF THE STRAW TECHNIQUE AND CONVENTIONAL TECHNIQUE FOR SAMPLE COLLECTION FOR RABIES FAT 122
Norazura A. Hamid

24. ASCARIDIOSIS COMPLICATED WITH MYCOPLASMA SPP. INFECTION IN VILLAGE CHICKENS 123
Siti Noorzeha Ramli, Nurul Faizah Zainal, Faizah Hanim Mohd Saeid, Rugayah Mansor, Rohaya Mat Ali

25. EVALUATION OF WHOLE BLOOD TEST KIT FOR SALMONELLA SCREENING FOR POULTRY 124
Dahlia Harun, Muhamad Marwan Ibrahim, Zarrahimah Zakaria, Nor Liyana Mohamas Razak, Zurin Azlin Mohamad Jinin, Sohayati Abdul Rahman

26. REPRODUCTIVE PERFORMANCE OF MAFRIWAL DAIRY CATTLE 125
Shariffah Nazari, Mastura Yaacob, Nor Aini Warzukni, Muhamad Ali Hanapiah Abd Manap, Chandrawathani Panchadcharam, Wan Ahmad Kamil Wan Nik

27. CUSTOMER SATISFACTION OF SERVICE QUALITY AT VETERINARY CLINICS IN SELANGOR 126
Norhariani Mohd Nor, Emielia Mat Ali, Mohamad Fazli Sabri, Puteri Azaziah Megat Rani

28. SPATIAL DISTRIBUTION OF POTENTIAL SWIFTLET FARMING AREAS BASED ON LAND USE STATUS IN JOHOR 127
Sharil Azwan Mohd Zain, Fakhrulisham Razali, Mohammad Masrin Azami, Norhaliza Abdul Halim @ Jamahuri, Nurfadnida Jaafar

29. NEW APPROACH OF DELIVERING INTRAMAMMARY INFUSION OF STEM CELLS SECRETOMES EMBEDDED HYDROGEL FOR BOVINE MASTITIS 128
Fhataheya Buang, Mohd Cairul Iqbal Mohd Amin

30. COMPARISON OF FATTY ACID PROFILE FOR CHICKEN MEAT PRODUCED FROM THE USE OF PALM KERNEL CAKE (PKC) FEED AND COMMERCIAL CHICKEN FEED. 129
Faridah @ Faridzah Ismail, Sharil Azwan Mohd Zain, Ramlan Mohamed

PREFACE

On behalf of the Scientific Committee, we would like to welcome all participants to the 30th Veterinary Association Malaysia Congress 2018, Petaling Jaya, Malaysia. With the theme "**HEALTHY ANIMALS, HEALTHY SOCIETY"**, scientists from institutions are here to share their experiences and findings in the field of veterinary and allied sciences.

This year, we received more than 100 scientific papers which will be presented either as keynote, plenary, oral, poster presentations or rapid oral. The scope of the paper varies from all kind of species from domestic to wildlife animals to many fields related to human and animals encompassing one-health concept.

To all participants, thank you very much for all the contributions and we sincerely hope that all of you will enjoy and have a fruitful congress.

VAM Congress Scientific Committee

KEYNOTE ABSTRACT

Veterinary services in Malaysia: its relevance to nation building

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A veterinarian is at the forefront in nation building. He is uniquely qualified to fulfil an array of roles apart from preventing disease and healing animals. Over the years, veterinary professionals have played considerable and contributory roles in animal and human health and welfare, food security, food quality and safety, ecology, ethology, epidemiology, physiology, genetics, psychology, drugs and pharmaceuticals development, biomedical research, rural development, as educators, trainers, and policymakers, economic development through livestock production and management and in wildlife conservation, and the protection of the environment and biodiversity.

The livestock sector is emerging as a propeller of agricultural growth in view of rapid growth in demand for animal food products. Veterinarians stand tall in their effort to upgrade the existing livestock production systems to make it more profitable and instilling the sense of security and confidence among the livestock owners. They also provide extension services towards spreading the awareness about animal health and welfare.

Veterinarians are at the vanguard in protecting the public health and welfare. It has been documented that 75% of diseases affecting humans originate directly or indirectly from animals. In the current era of globalization, the emergence or re-emergence of unexpected dreadful diseases is accelerating. According to OIE, it is estimated that five new emerging infectious human diseases appear each year, of which three are zoonotic. The Avian flu, Swine flu, recent Ebola epidemic as well as the too numerous human deaths caused each year by rabies, dreadfully remind us of the strong links existing between the health of people, animals and environment. Many of the infectious diseases (e.g. avian flu, swine flu, AIDS, CJD etc) spread in humans come from animals originally. Veterinarians partake in the effort to prevent spread of disease (non-zoonotic and zoonotic) in animals through stringent inspection and quarantine facilities. Veterinary professionals work to promote food security and ensure that food from animals is safe from farm to fork. Through strict inspections and controls, prior and after slaughtering, meat safety is constantly checked. At all phases of the production and distribution of food from animal origin they are involved in preserving its hygiene and safety.

Veterinary researchers are addressing important research issues related to disease epidemiology, biological terrorism and emerging diseases as well as in the areas of breeding, nutrition and modern animal husbandry through innovations. Malaysia has tremendous potential in the livestock and pet industry as seen from the successes in the poultry & pig industry.

"ASEAN Veterinary Statutory Body Network's strategic plans 2018-2020, the way forward for the regional standard of the ASEAN Veterinarians

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In establishment of trading within the ASEAN Community, the healthcare practitioner is one of the 7 professional services that has impact on the economic growth of ASEAN Member States (AMS). The free movement of healthcare practitioners has already been developed and implemented under the ASEAN Framework Agreement on Services (AFAS). However, veterinary profession has not been included in this framework. The first project of ASEAN Regional Forum on the Guideline of the Understanding Framework on the Veterinary Profession in ASEAN (GUFVA 2014) was conducted in June, 2014. Then, the ASEAN Veterinary Code of Conduct (AVCC 2016) in August 2016, was set up, reinforced and contributed as the mutual legislative agreement. The next roadmap would be the creation of ASEAN Veterinary Act before the MRA for veterinary professional can be developed. Since then, many joint projects and meetings have been continuously proceeded. One of the significant outcomes has been the initiative in establishing the ASEAN Veterinary Statutory Body Network (AVSBN), since 2015, of which the cooperation and collaboration of many related organizations in AMS is needed. The AVSBN will facilitate the development of the veterinary professional ASEAN Mutual Recognition Agreement (MRA) and this requires the fundamental agreements to maintain the sustainability and eliminate the restrictions from ASEAN acquisition competitiveness. In this regard, it is necessary to have the ASEAN standardization for veterinary profession.

The Workshop on ASEAN Veterinary Statutory Body Network's Strategic Plan 2018-2020 (AVSBN 2017) was held on 9th – 11th August, 2017 at the Faculty of Veterinary Science, Chulalongkorn University, Bangkok, and Veterinary Council of Thailand, Nontaburi, Thailand. It was co-organised by the Department of Livestock Development, the Ministry of Agriculture and Cooperatives, Thailand, the Veterinary Dean Consortium, the Thai Veterinary Medical Association under the Royal Patronage (TVMA), the World Organization for Animal Health (OIE), the South East Asian Veterinary School Associations (SEAVSA), and the Federation of Asian Veterinary Associations (FAVA) and funded by the government under the Innovative Thai-ASEAN Academic Co-operation of Chulalongkorn University.

The objectives of the workshop were to initiate the progress of AVSBN, to facilitate the workshop for exchange information and country experiences on equivalence professional skills in respect of mutual recognition agreements of ASEAN veterinary practitioners, to promote and integrate the understandings of ASEAN Veterinary Code of Conduct as a joint agreement that containing key principle guiding for ASEAN veterinarian, to establish the mutual recognition arrangement for ASEAN veterinary regional framework through ASEAN Secretariat. This will contribute a significant progress toward the veterinary professional responsibility to ASEAN Mutual Recognition Arrangement (MRA) in terms of vital policies and practices to successful integration of various sectors. The workshop comprised more than 15 delegates who are the high-level representatives of the various veterinary statutory bodies, associations, academic institutions, speakers from Australasian Veterinary Boards Council Inc. (AVBC) as well as private and non-governmental organizations of 9 AMS; Cambodia, Indonesia, Laos PDR, Malaysia, Myanmar, Philippines, Singapore, Vietnam and Thailand. The workshop was also attended by 12 observers from the Thai government, private veterinary organizations and academic institutes.

The workshop provided a draft of AVSBN strategic plan of 2018-2020 with the aims to: 1) sharing and harmonization of best practices and operational guidelines of the National VSBs and equivalent authorities of AMS; 2) supporting the development/establishment of fully functioning National VSBs in AMS currently without/in development; 3) Ensuring the capacity of National VSBs in promoting good governance of Veterinary Services (VS) both nationally and regionally; 4) linkages of AVSBN with VSBs/VSB authorities or relevant institutions in other regions for exchanging expertise, thereby improving the regional capacity of National VSBs for compliance with international standards; 5) ensuring the financial support for AVSBN to conduct the activities to meet its objectives.

In conclusion, the term of reference of ASEAN Veterinary Statutory Body Network has been adopted by the AVSBN. Veterinary Council of Thailand has been elected to be the Chair of AVSBN for 2018, also used as the location of the secretariat office. AVBC accepted to collaborate with AVSBN. Good progress has been made in AMS in strengthening the authority and capacity of VSBs in accordance with the OIE Standards. From now on the progress will be made by Cambodia, Laos, and Vietnam on the establishment of VSB. Likewise, the information of national VSB of AMS has been updated. Finally, the AVSBN's Strategic Plans 2018-2020 has been adopted. It was an honor for AVSBN, that the 26th ASWGL meeting, Siem Reap, Cambodia, last April 2018, the delegates agreed to the concept of AVSBN on support the development of an MRA for the ASEAN veterinary professional. Subsequently, the meeting requested Thailand to provide more detailed information on ASEAN MRA on Veterinary Practitioners for further discussion in the next 27th ASWGL meeting 2019, in Indonesia.

This actual implementation of AVSBN's strategic plans will facilitate a significant progress toward the veterinary professional responsibility to ASEAN MRA which has been coordinated by the Veterinary Council of Thailand as a preparation step for the formal establishment of free movement of veterinarians within the ASEAN Community in the near future.

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LIVESTOCK DRINKING WATER AND WASTEWATER QUALITY STATUS IN MALAYSIA: CHALLENGES AND SOLUTIONS

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The sudden surge in demand for meat and milk in Malaysia over the recent years magnifies issues of unmonitored quality status of livestock drinking water and improper wastewater management. As most ruminant farms do not use a conventional water source, the water quality is usually substandard and this could affect the performance of the animals. Many forms of contaminant, such as nutrients, heavy metals, organic pollutants, emerging pollutants and pathogenic microorganisms can jeopardize the health and well-being of the animals. The inadequate wastewater treatment in the farm contributes to the high contamination levels, especially when the water source such as ponds and wells are in close contact with the animals. The use a simple and cheap treatment, such as planting Vetiver grass may act as first step of series of treatments. Nonetheless, there is a need to approach the issues as a whole. The establishment of a Malaysian standard guideline of drinking water quality for livestock will benefit small holder farm owners in terms of increasing livestock production to meet the demand in the market. Sanitation status of ruminant farms in Malaysia should be periodically monitored to ensure the impact of the livestock sector on the environment will be still under control.

HOW GUT INFLAMMATION INFLUENCES ANIMAL PRODUCTION

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Inflammation is the animal's way to eliminate an offending agent and restore the normal function. In animal production process, a wide range of agents can be considered as antigens that potentially trigger gut inflammation, such virus, bacterial, toxin and feed. However, inflammation may not be consistently desirable and lead to a cost. Even a mild inflammatory reaction requires nutrients and energy that otherwise could be used for productive processes. Furthermore, gut inflammation has been approved to be associated with gut integrity, secondary infection, metabolic loss such as muscle waste and stress. Thus, a dysregulated inflammatory response can be detrimental to animal health and performance. However, the importance of inflammation remains greatly overlooked in current animal production industry. The hypothesis is proposed that inflammation may be the priority to consider to improve animal health, performance and welfare. Anti-inflammation can be a promising approach to develop sustainable production system, especially in in-feed antibiotic free practise.

Emerging Infectious Diseases: Avian Influenza H5N1 and SARS Coronavirus Evolutionary Trajectory in One Health

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The first documented cases of human infection of Avian Influenza H5N1 were recorded in 1997 in Hong Kong. Eighteen persons were infected with 6 deaths. The infections were traced back to life poultry in wet markets supplied by both local farms and from mainland of China. Outbreak control measures included culling of the entire poultry population (1.5 million birds) in 3 days.

In 2003, an outbreak of SARS coronavirus occurred in a major teaching hospital in Hong Kong infecting 139 health professionals, medical students, patients and visitors. This with other regional reports of outbreaks of a similar disease led to the recognition of a new disease and the subsequent global efforts to control of the epidemic and eradication of the infection in humans. The paper will discuss the trajectory of application of one health in the control of the 2 new zoonotic disease in humans in Hong Kong.

Oral Presentation

DEVELOPMENT OF LIVESTOCK IN MALAYSIA - ISSUES AND CHALLENGES

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The livestock industry has transformed into a progressive industry with a large increase in production, the quantity of wastes being produced have increased exponentially, leading to environmental pollution issues from livestock wastes. The abatement of pollution has not been advanced proportionately with the expansion of livestock industry causing pollution to land, water and air. The challenge to overcome livestock waste pollution is now becoming a major task for people that are involved in the livestock industry. Pig farming has been incriminated as one of the major sources of water pollution compared to cattle farming (dairy and feedlot) due to bigger feedlots size. The cattle farming causes less pollution due to small numbers and sizes of the feedlots. Meanwhile, the management disposal of poultry manure is not difficult in general as the manure can be utilised as organic fertilisers. However, due to poor management practices in some farms such as leaking water drinkers, an inefficient and unattended collection of manure droppings and non-cemented flooring for the collection of manure, have resulted in the droppings to be severely wet and enhances fly breeding with the emission of offensive malodours. Livestock wastes have been an increasingly prominent universal environmental quality issues and receiving greater attention from policy makers and the general public. Knowledge, skills, expertise and experience are required by the Government and animal industry players to address the pollution issue. Implementation and enforcement of regulations with policies by the Government can further enhancement efforts to reduce animal waste pollution in the future.

PRELIMINARY STUDY ON DETERMINATION OF DRINKING WATER AND WASTEWATER QUALITY IN SELECTED DAIRY CATTLE FARMS AND ELUCIDATE THE CLINICOPATHOLOGICAL EFFECTS AND HOST CELL RESPONSES OF CONSUMING DIFFERENT QUALITIES OF DRINKING WATER AND WASTEWATER USING ANIMAL MODEL STUDY.

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According to the National Water Quality Standards, any water source with a classification of Class III and less is deemed suitable for animal consumption. In this preliminary study, 7 dairy cattle farms were selected and both drinking water and wastewater samples were collected for analyses. In conclusion the result revealed that 57.14 % of the drinking water samples do not comply with the minimal requirement (Class III) for livestock drinking water quality as set by the National Drinking Water Standards.This study result revealed that all the wastewater samples collected from the farms were of Class V. To elucidate the effects of consuming different drinking water qualities and exposing the detrimental waste water quality in the host, a preliminary study using animal model was designed. A total of 35 female mice were divided into 5 groups, with 7 mice per group. All mice were gavage fed with 0.25 ml of the water samples three times daily for a period of 30 days. In conclusion, it was observed that the host cell response demonstrated that prolong exposure of animals towards low drinking water quality lead to detrimental effects towards the host and affect the biomarkers, reproductive hormones and stimulate antibody responses. There were also detrimental cellular changes observed in vital and reproductive organs. It is advised to monitor drinking water quality in farms and proper wastewater treatment in farms prior released of the wastewater to the environment. This will help in welfare of the animal and good environment management.

POTENTIAL OF BIOGAS PLANTS FROM LIVESTOCK WASTE DEVELOPMENT IN MALAYSIA

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With the difficulty of disposal of a large amount of manure, this could cause a serious pollution threat and high nutrient release into the environment. A large amount of animal waste produced is one of the cost-effective and renewable substrates that can provide a significant source of biogas generation. Biogas is a sustainable energy carrier which is mainly composed of methane and carbon dioxide. Anaerobic digestion (AD) of renewable feedstocks has been known as a potential technology for the production of clean energy in many countries. Hence, the treatment of huge amount of the livestock manure in AD is helpful for the appropriate management of the manure by decreasing its polluting effect on the environment and producing biogas as a valuable renewable energy source. A pre-feasibility study for the development of biogas plants using livestock waste locally was conducted. The finding of the study showed an uncertain future of its development, mostly due to technical reasons. The optimum biogas yield from a specific organic waste source is dependent on a number of variables such as digester design, mixing, heating, temperature, type and quantity of feedstock, geographical location and operator. Each of these variables could determine the ultimate viability of the project. Though the biogas produced could be used to generate either heat or electricity or both, the financial viability of the project will thus depend on the optimal use of the energy produced based on the specific needs and requirements of the client's operations.

THE ASSOCIATION OF INBREEDING COEFFICIENT AND GROWTH TRAITS OF SWAMP AND MURRAH-CROSS BUFFALOES IN SABAH

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Inbreeding has became a common practice in livestock farms and its depressive effect on performance of the animals is quite worrisome. This study aimed to measure the inbreeding coefficient level and evaluate its association with birth weight and weaning weight of Swamp and Murrah-cross buffaloes in Sabah. Data on identification number, breed, age of weaning, birth and weaning weight of 50 buffaloes (F2) in Pusat Pembiakan dan Penyelidikan Kerbau, Telupid was collected. Identification numbers of sire and dam (F1) and parent (P) were recorded to indentify whether the animals were inbred or outbred. Inbred individuals then classified into three inbreeding systems and inbreeding coefficients were calculated. Birth and weaning weight of each animal was regressed on inbreeding coefficient to determine the effect of inbreeding on these growth parameters. 17 out of 50 buffaloes were inbred and inbreeding coefficients of both breeds showed no association with their birth and weaning weight. This could be due to the inbreeding coefficients calculated in this study were not high enough to cause inbreeding depression on birth and weaning weights of the animals. These two growth parameters could be influenced by other factors such as genetic and environment which may be had a greater influences compared to level of inbreeding in these buffaloes.

Keywords: *inbreeding, inbreeding coefficient, buffalo, growth traits, outbred*

SEROPREVALENCE OF LEPTOSPIROSIS AND BRUCELLOSIS IN LONG-TAILED MACAQUES (MACACA FASCICULARIS) OF PENINSULAR MALAYSIA

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Leptospirosis and brucellosis are important zoonotic diseases worldwide with high incidence in tropical countries affecting biodiversity, human and livestock health, animal welfare and the economy (OIE, 2014; WHO, 2011). The expanding human population along with rapid urbanization have increased the likelihood of wildlife and human interaction. In Malaysia, increased human-macaque conflicts (Hambali, 2012) have resulted in the concern of zoonotic disease transmission. This study was conducted to determine the seroprevalence of leptospirosis and brucellosis in wild long-tailed macaques (*Macaca fascicularis*) of Peninsular Malaysia. A hundred serum samples were screened for antibodies against leptospirosis and brucellosis using microscopic agglutination test (MAT) and Rose Bengal Plate test (RBPT) respectively. Fourteen percent of macaques were seropositive for Leptospirosis with serovar Cellodoni (4%), and Pyrogenes (4%) as the most common serovar identified, followed by Icterohaemorrhagiae (3%), Bataviae (2%) and Lai (1%). The prevalence in males were significantly higher than females. Males were 4.5 times more likely to be seropositive for leptospirosis compared to females. This suggests that sex differences in behaviour influences exposure of macaques to leptospirosis. There were no significant difference in seroprevalence with age, habitat and region. All samples were seronegative for Brucellosis. This study concludes that leptospirosis are prevalent in long-tailed macaques and poses a public health risk of cross-species transmission.

MANAGING NECROTIC ENTERITIS IN COMMERCIAL BROILERS WITH BETTER GUT PROTECTION

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Proper gut management is imperative for success in modern livestock production. Any factor that influences gastrointestinal health will undoubtedly change its nutrient uptake and requirements, resulting in altered performance. The basis of gut health lies in its integrity, which constitutes a highly complex process encompassing macro- and micro-structural integrity of the gut, microbial equilibrium, status of gut-associated immune system and the energetic cost of metabolism. Stressors negatively impact several components of the intestinal barrier function and adversely increase epithelial permeability. The gut protects itself by a combination of gut function, immunological, physiological and physical barriers. When exposed to stress, the animal faces a variety of challenges that are either overt-clinical, or subtle-subclinical conditions. Animals repartition nutrients to overcome these challenges through various means such as immune system activation, estimated to cost 10-12% of nutrients absorbed at any given time. Necrotic enteritis (NE) is caused by *Clostridium perfringens*, a disease historically suppressed by antibiotic growth promoters such as bacitracin and narasin. When such antimicrobial compounds are removed, NE could prove to be very costly to the poultry industry. To tackle NE, one needs to understand the contributing factors that lead to the overgrowth of *C. perfringens* in the gut. Probiotic and phytogenic products have been shown to improve many aspects of production in commercial broilers, including significantly reducing the effects of NE. The data presented suggests that these natural additives provide producers with an alternative management tool with potential to optimise gastrointestinal health and decrease monetary losses due to the disease.

THE IMPACT, PREVALENCE AND MANAGEMENT OF MYCOTOXINS IN POULTRY

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Mycotoxins are secondary metabolites produced by fungi that have deleterious effects on poultry, other species of livestock animals and even humans. Multiple mycotoxin contamination of feed is an increasingly common trend, and presents additional problems, as certain combinations of mycotoxins are known to have synergistic effects that aggravate the health and performance of livestock. In poultry, mycotoxins are known to decrease performance, cause reproductive disorders and poor egg production, increase mortality rates, and trigger immunosuppression that results in vaccination failures and higher susceptibility to diseases. Every year, the annual Global Mycotoxin Survey provides an insight on the incidence of aflatoxins, zearalenone, deoxynivalenol, T-2 toxins, fumonisins and ochratoxin A in the primary components used for feed which include corn, wheat, barley, rice, soybean meal, corn gluten meal, dried distillers grains and silage, among others. The latest survey results indicate that livestock feed and raw materials in Asia are increasingly contaminated with mycotoxins, and that there is a high occurrence of cross contamination with two or more mycotoxins (multi-mycotoxin contamination). Avoidance of contaminated feed ingredients and attention to feed storage conditions are logical approaches to reducing the mycotoxin risk. However, mycotoxin contamination of feedstuffs occurs despite the most strenuous efforts on prevention. The most reliable approach is to combine prevention and detection with regular application of additives proven to adsorb and biotransform or deactivate mycotoxins in the intestinal tract of poultry and other livestock species. Bioprotection from phytogenic and phycophytic compounds provide additional protection from liver damage and immunosuppression caused by mycotoxins.

MORTALITY RATE AND SURVIVABILITY OF CATS DIAGNOSED WITH CHRONIC KIDNEY DISEASE

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Chronic kidney disease (CKD) is commonly diagnosed in cats; especially in geriatric patients. Early management of CKD patients is crucial in order to slow down the disease progression. Management of feline CKD includes controlling proteinuria, maintaining the level of serum creatinine, level of inorganic phosphate, and hypertension (if present). This study determined the mortality rate and survivability of cats diagnosed with CKD. Patients files of cats diagnosed with CKD from year January 2016 to December 2017 were reviewed. Based on the blood result, urinalysis, blood pressure measurement, each cat patient's kidney condition were staged and majority of these cats were categorized as CKD Stage 4 patients. Each owners were contacted for follow-up of the patient condition. In this study, the mortality rate of cats diagnosed with CKD (*n*=106) were 81.1% with mean survival of 280 days (range from 1 to 1524 days). Owner compliance towards the treatment regime for their cats did not significantly improved the survivability of CKD cat patients (with or without proteinuria). However, based on the anecdotal experience of the clinicians in this study, it was observed that the CKD cat patients managed properly has a longer survival period with better quality of life.

Keywords: cat, chronic kidney disease, proteinuria

A CASE REPORT: FELINE DILATED CARDIOMYOPATHY

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A 2-year-old male Domestic Shorthair cat was presented with history of inappetant and exercise intolerance. Upon presentation, the rectal temperature and respiratory rate were normal. Arrhythmia was noted with a heart rate of 120 beats/minute and strong palpable femoral pulses. Thoracic radiograph revealed cardiomegaly with cardiogenic pulmonary edema. Based on echocardiography, cat was diagnosed with dilated cardiomyopathy (DCM). Treatment was initiated with oral combination of frusemide (2 mg/kg for 2 week, tapering off regime) and benazepril hydrochloride (0.5 mg/kg q24hr). Pulmonary edema resolved and cat was maintained on benazepril hydrochloride for 120 days. Despite the long-term treatment prescribed, clinical sign of exercise intolerance remained. The heart medication was then changed to pimobendan (0.2 mg/kg total dose divided q12hr, off-label used in cats) as it has shown to benefit dogs diagnosed with DCM. To monitor the effectiveness of pimobendan in this cat, the cardiac biomarkers namely cardiac troponin I (cTnI) measured before and after treatment shown improvement. Besides that, cat's average blood pressure measurements improved, gained body weight, active and exercise intolerance was no longer evident. After 60 days of treatment, cat's condition improved clinically and pimobendan was continued as a long-term treatment for this case.

Keywords: Feline Dilated Cardiomyopathy, cardiac biomarkers, echocardiography.

A PRELIMINARY STUDY ON THE STATUS OF THE POPULATION OF FREE ROAMING DOGS IN PULAU PINANG

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Free roaming dogs (FRD) are defined as unconfined dogs and are not prevented from roaming. These FRDs are known to have habituated to living closely with people with or without an owner in attendance. In Malaysia, the status quo of our FRDs and its management is inconclusive. This study was initiated after the 2015 Rabies outbreak in Pulau Pinang and involves many parties that are either involved directly or indirectly in the management of these FRDs. There are four main categories that are the public (people and tourist), Government Bodies (Department of Veterinary Services (DVS) and Local Municipality), Non-Government Bodies (NGO) and small animal private practitioner working along with NGOs. Four sets of questionnaires are prepared according to these groupings, respectively. Participants can either choose to be interviewed or fill in the questionnaires at their convenience. A total sample of 200 participants comprising of all four main categories is taken into consideration. All data are compiled and analyzed accordingly either by fundamental statistical analysis and SPSS program. This study has a significant impact on our animal welfare as the Animal Welfare Act 2015 was approved. Thence, we can determine how far our animal welfare is being practiced and simultaneously a bigger overview of our FRDs altogether. Preventive measures and control actions can be executed if warranted. Thenceforth, any obstacles prevailing with the current department and country stand regarding these FRDs can be identified and addressed concurrently.

THE COLLECTIVE ASSEMBLAGE OF FELINE INFECTIOUS PERITONITIS (FIP) IN CATS FROM THE FOUR-QUARTERS OF THE POST MORTEM TABLE

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Feline Infectious Peritonitis (FIP) is a common, fatal and immune-mediated disease of cats caused by feline coronavirus (FCoV) infection. The clinical manifestations of FIP can be either a pathogenic disease or more commonly a benign or mild enteric infection. Collectively, four cat carcasses that comprised of three kittens (two to four months) and an adult were received by Veterinary Research Institute (VRI) Ipoh for disease investigation. Upon general examinations, the cats were extremely emaciated (BSC: 1), fur were ruffled, very dehydrated, skin being icteric and pale too. The gums and tongue were also inflamed and had ulcers. The eyes were sunken with the third eyelid being apparent, icteric and also with anterior uveitis. A detailed post-mortem examination revealed both thoracic and visceral organs as icteric too especially at the heart, lungs, liver including the muscles. Accumulations of abdominal and pleural effusion were also observed. The fluids were yellowish straw-like colour exudatesas observed in three carcasses and absented in one carcass, which implies both the effusive and non-effusive form of FIP.Molecular diagnosis through Nested Reverse Transcriptase Polymerase Chain Reaction(nRT-PCR) confirmed it as positive for FCoV. Hence, a definitive diagnosis for both the effusive and non-effusive form of FIP were concluded for all four cats based on post-mortem findings with the confirmation and supportive results from the laboratories. Being difficult to diagnose in nature, multiple diagnostic tests can be used to confirm FIP and help to rule out other fatal feline diseases.

MENINGITIS IN INFANT ORANGUTAN (PONGO PYGMAEUS) AT ORANG UTAN ISLAND, BUKIT MERAH, PERAK, MALAYSIA

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Bukit Merah Orang Utan Island (BMOUI) serves as an ex-situ conservation facility for the endangered Bornean orangutans. The role of the Infant Care Unit (ICU) was to provide the veterinary care for infant orangutans, to create public awareness and to provide the public with an opportunity to view how the veterinary care was provided for the infant orangutan. Seizures were not very common in infant orangutan. Meningitis can be caused by bacteria, virus, protozoan, and other pathogenic microorganism. Seizures can occur during fever when temperature goes above 36°C. Seizures also occur in infant orangutan due to electrolyte imbalance such as Sodium, (Na+), and Potassium, (K+). Early diagnosis and treatment were necessary for a quick recovery.

RESPIRATORY TRACT INFECTION IN INFANT ORANGUTAN (PONGO PYGMAEUS) AT ORANG UTAN ISLAND, BUKIT MERAH, PERAK, MALAYSIA

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SCREENING OF WEST NILE VIRUS ANTIBODY IN MACAQUE TO UNRAVEL THE STATUS OF THE DISEASE IN SELECTED AREAS IN WEST COAST MALAYSIA

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West Nile Virus (WNV) is a zoonotic virus which categorized as an arthropod-borne virus that native to Africa, Europe, and Western Asia. It is a member of *Flaviviridae* in the genus *Flavivirus*. WNV circulates among birds but also can infect mammals. Based on the previous study in *orang asli* and companion bird revealed that there was seropositivity against WNV in Malaysia. Since macaques are potential mammals to be exposed to the biting of mosquitoes infected with WNV, this study aims to detect the presence of WNV in macaque via serological methods by using competitive ELISA. The serum samples which are archived samples took from Wildlife Department Cheras were collected from 40 macaques and screened for WNV antibodies. The results showed that 60% (24 out of 40) samples macaque were seropositive against WNV. The positive result indicates that the infection with WNV at some time in the past. In conclusion, the result from this study demonstrate the evidence of widespread of WNV infection in macaque in West Coast Malaysia with a high seroprevalence to WNV.

Keywords: West Nile Virus, zoonotic, macaque, ELISA

THE EFFECT OF USEFUL MICROBES-BOKASHI ADDITION TO DIET ON WEIGHT GAINS OF RABBIT

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An experiment was carried out to evaluate the effect of useful microbes-bokashi addition to the diet on the weight gains of rabbits. In total, 20 weaned rabbits (30 days old) of crossbred were divided at random among two groups (experimental and control) at the rate of 10 young rabbits per group. Rabbits in control group (C) were fed with a commercially available pellet, while the experimental group (UM-B) received a commercially available pellet mix with 5% useful microbes-bokashi (useful microbes in the form of granules). At 70 days old, the average live weights of rabbits were 726.0 g and 762.0 g in respectively, C and UM-B groups. At the end of the trial (150 days old), the highest average live weight was observed in the experimental group (UM-B; 1495.0 g) when compared to the control (C; 1470.0 g). In conclusion, the supplementation of useful microbes-bokashi at 5% in the rabbit's diet showed a positive effect on weight gains in rabbits.

MOLECULAR DETECTION OF INFECTIOUS BRONCHITIS VIRUS (IBV) FROM AVIAN SAMPLES IN RVLBT USING RT-PCR AND NESTED PCR

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This paper reports the detection of Infectious Bronchitis Virus (IBV) from avian samples submitted to Regional Veterinary Laboratory at Bukit Tengah (RVLBT) by Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) and Nested Polymerase Chain Reaction (PCR) techniques. The cases were diagnosed with established RT-PCR and Nested PCR methods as a rapid diagnostic tool for IBV. These viruses that been detected in species of birds and chicken probably have similar genome organization and in gene sequence to IBV. Nowadays, molecular detection has been widely used for detection of IBV whereby there are universal oligonucleotides pairs for detection of IBV in RT-PCR has been designed such as UTR1 & UTR2 and S1. Meanwhile, universal oligonucleotides pair UTR3 & UTR4 were used in Nested PCR to detect for greater specificity and sensitivity of IBV. Different species of avian samples were selected from cases received by RVLBT and the RNA was extracted according to the standard protocols. Overall, the avian non-poultry samples were tested positive coronavirus using oligonucleotides pair UTR3 & UTR4 while tested negative using oligonucleotide pair S1 as well as it showed significances in terms of specificity and sensitivity. Interestingly, 12/30 of the avian poultry samples were tested negative with oligonucleotides pair UTR1 & UTR2 but were then tested positive IBV with oligonucleotides pair UTR3 & UTR4. However in Malaysia, the issue of detection of positive IBV in avian samples was still insufficient even with less study was done on molecular detection of IBV from avian field samples.

Keywords: Infectious Bronchitis Virus, RT-PCR, Nested PCR, avian poultry, avian non-poultry.

GROWTH AND FEED CONVERSION EFFICIENCY OF MALIN LAMBS IN INTENSIVE PRODUCTION SYSTEM

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Fourteen weaned Malin lambs (3-month of age), seven from each male and female lambs were fed with 3% of body weight of concentrate and *ad libitum* forage diet under intensive system for 3 months. Average daily weight gain (ADG) and feed conversion ratio (FCR) were analyzed at 6-month of age. On average the lambs consumed 72.26 and 63.38 g dry matter (DM), 9.48 and 8.35 g digestible crude protein and 47.06 and 41.44 g total digestible nutrients (TDN) for average daily gain of 0.11 and 0.09 kg in male and female lambs, respectively. Weaning body weight was not significantly different in the two sex groups while the final body weight after 90 days of intensive feeding was significantly higher in male (22.0 kg) than female (18.50 kg) lambs. Likewise, total body weight gain in the experiment and average daily gain (ADG) were also higher in male than female lambs. The male showed better weight gain than female lambs during the experiment. Both male and female lambs showed progressive gain in body weight over the experimental period while the rate of gain was better ($p< 0.05$) in male than female lambs. The feed conversion efficiency was better in male than female lambs with 5.64 and 6.26 feed conversion ratio, respectively in the two sex groups but the difference is not statistically significant. The study showed that there was an improvement in genetic quality of Malin breed since 1970's particularly in ADG and body weight at 6-month age.

EDIBLE BIRD'S NEST: POTENTIAL REPRODUCTIVE HEALTH BENEFITS

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Edible bird's nest (EBN), a natural product from the saliva of Swiftlets, is traditionally considered as powerful medicine which has been used to alleviate a number of ailments by the Chinese community for centuries. Research on various aspects of EBN including its nutritional and health benefit has gained momentum recently and scientific explanations are being provided largely supporting the traditional beliefs. Although enhancement of reproductive wellbeing and behaviours such as libido are among the traditionally believed benefits of EBN consumption, it remains among the broad spectra of research areas which are yet to be addressed and proven scientifically. Emerging research findings on EBN in topics other than reproduction have shown that EBN possess a number of biological properties, including the ability to stimulate growth and proliferation of stem cells, epidermal growth factor (EGF) – like activity, enhance production of reproductive hormones like oestrogen and act as an antioxidant. It is palpable that all these biological properties of EBN would have a potential influence on the process of mammalian reproduction and fertility. The aim of this paper is to highlight the possible mechanisms by which how those already described biological properties of EBN could be linked to reproduction as well as to share some of the latest research findings that support the traditional claim on EBN's role towards reproductive health.

ISOLATION OF MYCOBACTERIUM AVIUM FROM EXOTIC CAPTIVE BIRDS IN PENINSULAR MALAYSIA

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Avian tuberculosis is a chronic disease affecting all species of birds. It is mainly caused by *Mycobacterium avium* subsp *avium*. It causes irreparable losses in endangered species of the birds. There is lack of published data about the occurrence of avian tuberculosis in Peninsular Malaysia. This study reported the isolation of *Mycobacterium avium* subsp. *avium* (MAA) in the exotic captive birds in central region of Peninsular Malaysia. Fecal samples (*n* = 96) were decontaminated with 1% Cetylperidinium chloride and VNA antibiotic mixture (vancomycin 100 µg/ml, nalidixic acid 100 µg/ml and Amphotericin B 50 µg/ml) and cultured onto Löwenstein-Jensen. Isolates were confirmed by Ziehl-Neelsen staining, PCR and sequencing. Two isolates were confirmed by Z-N staining as *Mycobacterium*. Isolate from White Pelican *Pelecanusono crotalus* (*n* = 1) was confirmed as *Mycobacterium avium* subsp *avium* by PCR (16S rRNA and IS*901*) and sequencing. PCR could not be performed for isolate from Parakeet *Phigys solitaries* (*n* = 1) due to insufficient number of colonies. Proportion of contaminated cultures was 13.1%. It is concluded that exotic captive birds in Peninsular Malaysia are infested with *M. avium*. The decontamination of fecal samples following a two-step procedure with 1%CPC and VNA could ensure a high recovery of more mycobacteria with lowest contamination of cultures.

Keywords: Avian tuberculosis, *Mycobacterium avium* subsp *avium*, White Pelican, culture cetylperidinium chloride, VNA, Peninsular Malaysia

EFFECT OF ANTIMICROBIAL GROWTH PROMOTER AND PHYTOBIOTICS SUPPLEMENTATION ON TIBIAL BONE MORPHOMETRIC CHARACTERISTICS AND STRENGTH IN CHICKENS

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Frequent use of antimicrobial growth promoters (AGP) in chickens leads to the development of antimicrobial-resistance. Hence alternatives are introduced, such as medicinal plants that possess high potential. This study was conducted to evaluate the effects of (AGP) and *phytobiotics* on the tibial bone morphometric characteristics and strength in chickens. 160 day-old chicks (*Cobb 500*) were distributed in completely randomized design into 4 groups (n=40) with 5 replicates (each replicate n=8). The following treatment protocol was adopted; Group-1 T_1 was offered a basal diet (BD) and served as control. Group-II T_2 was supplemented with (BD + *Piper betle* 8g/kg of feed), Group-III T_3 was supplemented with (BD + *Persicaria odorata* 6g/kg of feed) and Group-IV T_4 was supplemented with (BD + Tetracycline 0.02g/kg of feed). The results showed that the weight, length, diaphysis diameter, lateral wall thickness, medial wall thickness and tibiotarsal index of tibial bone was significantly higher ($P<0.05$) in chickens supplemented with treatment than the control group, among treatment groups the bone index of *Piper betle* supplemented group was highest. Medullary canal diameter of the control group was significantly higher ($P<0.05$) than all the treatment groups. The strength of bone and percent ash was significantly higher ($P<0.05$) in all treatment groups than the control group which was highest in tetracycline supplemented group. In conclusion, the use of *phytobiotics* as feed supplement can improve bone characteristics, density, and quality in chickens, comparable to conventional antimicrobial growth promoters.

POSITIVE DETECTION OF PLASMID MEDIATED COLISTIN RESISTANT (MCR-1) GENE IN SALMONELLA SPP. ISOLATED FROM CHICKENS

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The emergence of multidrug resistant (MDR) is a major threat worldwide, and it has become worse with the emergence of resistant towards colistin antibiotic. The plasmid mediated colistin resistant gene (*mcr-1*) present in the bacteria contribute much to the spread of colistin resistant among Enterobacteriaceae such as *Escherichia coli* and *Salmonella* spp. Since the first description of *mcr-1* gene in *E. coli* from food animals in year 2015, numerous reports had revealed a worldwide spread of *mcr-1* gene among foodborne pathogen. In Malaysia, there is a lack of data on detection of *mcr-1* gene among salmonella strains in food producing animals. Hence, this paper focuses on the detection of *mcr-1* gene in *Salmonella* spp. isolated from chickens in VRI using published primers. A total of 183 salmonella isolates were retrieved from diagnostic cases and were used in this study. 2.18% (4/183) of the isolates were found to carry the *mcr-1* gene. This finding supports the existence of *mcr-1* gene in *Salmonella* spp. from chickens in the country. Colistin was recognized as the last resort antimicrobial agent in human for the treatment of multidrug resistant Gram negative bacterial infection, in spite of its toxic effects. Antimicrobial resistant problem become complex when the bacterial strain carries the *mcr-1* gene become highly resistant to the last choice of antibiotic and lead to treatment failure. Inter-agencies collaboration to gather the baseline data on colistin usage is crucial to assess the issue and help to draw guideline to reduce the impact of colistin resistance in Malaysia.

CHARACTERIZATION AND IN VITRO RELEASE STUDIES OF COCKLE SHELL CALCIUM CARBONATE ARAGONITE NANOPARTICLES LOADED WITH OXYTETRACYCLINE

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The need for alternative drug delivery systems in the treatment of resistant bacterial infections makes characterization of nanoparticles loaded antibiotic utmost priority. In this study, we synthesized calcium carbonate nanoparticles (CS-$CaCO_3$NP) from cockle shell for oxytetracycline (OTC) delivery. Cockle shell (*Anadara granosa*) was processed via a hydrothermal approach. Characterization to ensure the nanoparticles produced had the desired properties was done using Zeta analysis, Transmission electron Microscopy (TEM), Field emission scanning electron microscopy (FESEM), X-ray Diffraction (XRD), and Fourier Transform infra-red spectroscopy (FTIR). Oxytetracycline loaded calcium carbonate nanoparticles (OTC-CS-CaCO3NP) was further characterized pharmacologically to achieve the desired encapsulation efficiency and loading capacity. *In vitro* release assessment of OTC from the formulated OTC-CS-$CaCO_3$NP was carried out at pH 4, 6, 7.4 and 8.0. Morphological and pharmacological characterization revealed OTC was successfully fed into CS-$CaCO_3$NP which was sustainably released *in vitro* over a period of 96 hours. Zeta analysis revealed a potential of -19.9 ± 1.3 for CS-$CaCO_3$NP which increased to -23.5 ± 1.1 for OTC-CS-$CaCO_3$NP. CS-$CaCO_3$NP and OTC-CS-$CaCO_3$NP had average size of 29.90 ± 6.30 and 53.73 ± 10.50 on TEM, respectively. Of all the different OTC: CS-$CaCO_3$NP tested, the ratio with the formulation 1:3 had the highest drug loading efficiency (89.6%). FESEM, XRD and FTIR indicated that both OTC and CS-$CaCO_3$NP maintained its elemental composition, crystallinity and functional groups in the newly synthesized OTC-CS-$CaCO_3$NP. OTC-CS-$CaCO_3$NP is a promising nanoparticle antibiotic delivery system with efficient physico-chemical and pharmacological properties.

Keywords: oxytetracycline, zeta potential, TEM, XRD, calcium carbonate aragonite nanoparticle.

KETAMINE HYDROCHLORIDE COMBINED WITH XYLAZINE HYDROCHLORIDE IN LARGE ZOO FELINES: A 15 YEAR STUDY (1988-2003)

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Chemical immobilization by anaesthesia with ketamine hydrochloride (KTH) - xylazine hydrochloride (XZH) has been widely used in large felines. This study was aimed to unveil the relationship between time of effect and effect of anaesthesia with KTH-XZH. Data were retrieved from existing anaesthesia records from different zoos in Malaysia. A total of 66 large felines belonging to 5 different species namely, *Panthera tigris jacksoni* (*n* = 4), *P. tigris* (*n* = 10), *P. leo* (*n* = 12), *P. tigris sumatrae* (*n* = 17) and *P. leo persica* (*n* = 23) were involved in this study. All felines were successfully anaesthetized using KTH-XZH. The relationship of dose with effect of anaesthesia and time of effect were tested. The effects of variables such as body weight, sex, health status, demeanour and fasting time on dose selection were also evaluated. The results showed that the effect of anaesthesia and time of effect had no significant correlation with dose. Among the variables studied, only weight had significant ($p = 0.016$ and $p = 0.002$) effect on dose. When an average dose (KTH = 363.33 mg; XZH = 185.98 mg) was given to the felines, it gave positive correlation with time of effect ($r_{ketamine} = 0.220$; $r_{xylazine} = 0.324$). Similar findings were observed for effect of anaesthesia ($r_{ketamine} = 0.156$; $r_{xylazine} = 0.227$). Although the effect and time of effect were dose-independent, it is important to determine the weight of the large felines so that the drug administered were sufficient to produce the desired anaesthetic effect.

CARCINOID TUMOUR (ARGENTAFFINOMA) IN CAPTIVE BARKING DEER (Muntiacus muntjac)

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Carcinoid tumour can happen in man and animal at any part of the GIT which derived from any enteroendocrine cells. The metastases can cause carcinoid syndrome; an increased secretion of serotonin which only reported in human. In this study, a 10 years old male barking deer in Wildlife Conservation Center was found dead after treatments. Samples were sent to laboratory for further analysis. The aim of study is to describe the findings of carcinoid tumour in abomasum of captive barking deer as it is has not previously been reported. During investigation, the animal was reported having good appetite and bright-alert. But the next day, the animal was found lying on the ground with hyperthermia and muscle constraint. In gross pathology examination, the abomasal mucosa were diffuse reddish in colour with soft to watery faeces. Other organs, such as brain and lung observed marked to moderate congestion. There were whitish striking to patchy appearance in serosal surface of heart. Microscopically, numerous number of cells with granular eosinophilic cytoplasm occupied in the section. Some of them were having mitosis (2-3nuclei). This neoplastic cells were seen effaced the architecture of abomasum mucosa cardiac region. Bacterial isolation were *E.coli*, *Moraxella sp*. and *Klebsiella pneumoniae* and there were no virus isolation. This tumour cell demonstrates an affinity for silver stain in Fotana-masson silver and Grimelius - pascual's modified techniques which had been used in previous studies. The use of established biomarker are appropriate for further investigation.

Keywords: Barking deer, captive, carcinoid tumour, abomasum, pathological descriptions

EFFECTS OF SYNCHRONISATION ON REPRODUCTIVE PERFORMANCE IN SWAMP BUFFALOES

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Buffaloes in Sabah are commonly reared as draught animal in oil palm plantations. Due to their poor reproductive performances, it is difficult for the farmers to plan for a proper breeding programme. Therefore, this study was conducted to determine the effects of synchronisation on reproductive performance in Swamp buffaloes. A total of 15 Swamp buffalo cows were selected based on the predetermined criteria. They were divided into three groups and treated with three methods of synchronisation protocols namely *Ovsynch* (G1), CIDR-$PGF_{2\alpha}$-GnRH (G2) and CIDR-$PGF_{2\alpha}$ (G3). Observations of oestrus behaviour was done for 5 days post-synchronisation with the presence of bull in each group. Throughout the experiment, two buffalo cows were excluded from G1 and G3. Observations done shows that most of the oestrus signs were seen in the morning on the third day post-treatment. Vaginal sniffing and restlessness were the most oestrus signs observed. Pregnancy diagnosis performed 45-60 days post synchronization showed that 38.5% (n=13) of the animals were pregnant with 50% (n=4) in G1, 20% (n=5) in G2 and 50% (n=4) in G3. This study concluded that oestrus synchronization using protocol 1 and protocol 3 resulted in higher pregnancy rates. In addition, protocol 1 will be the best option to be used for breeding programme considering its practicality of application and cost effectiveness.

SPINAL PATHOLOGY ASSOCIATED WITH EQUINE BACK DISORDERS: CASE REPORT

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Back pain is the major cause of loss of performance in athletic horses. Although, the mechanism of development and the structures involved in equine back pain are generally known, there are very few pathological evidences associating spinal cord injury with the disorder. In this study, we described spinal pathology in 7 adult endurance horses, comprising of 2 mares and 5 geldings, diagnosed with chronic back pain. The horses were subjected to complete physical, neurological, and radiographic examinations. Post-mortem examinations were conducted on 4 horses. The location of back pain in all horses was the area under the saddle between T8 and L5. Only 2 horses showed neurologic deficit. The radiographs showed evidences of varying degree of kissing spines characterised by narrowing of interspinous spacing, touching or over-riding, sclerosis, bone remodelling and complete fusion of dorsal spinous processes (DSPs). Grossly, there were spinomalacia and intramedullary spinal cord haemorrhage involving the gray and some aspect of white matter, and DSPs showed evidences of osteophytes formation and ankylosis. The spinal cords were characterized by congestion, haemorrhage with medullary disintegration, demyelination of axons, myelin sheath dilation, axonal swelling and/or loss, and gliosis. Although, some horses did not show neurological deficit, the macroscopic and microscopic spinal cord lesions were suggestive of post-traumatic spinal injury. The study shows that among the causes of equine back pain are abnormalities of multiple structures of the spine.

Keywords: back pain, horse, spine, abnormalities

INVESTIGATION OF WOUND HEALING EFFECT OF Channa Striatus EXTRACT ON PERIODONTAL DISEASE IN CATS

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Channa striatus (Haruan) is known for antibacterial and anti-inflammatory properties in medicine. The aim of this study is to assess the healing effect of *Channa striatus* extract on periodontitis in cats and investigate the relapse of gingivitis after treatment. Ten periodontitis cats (stage one and two) were selected for this study. The cats were divided randomly into three groups which were the experimental group (*Channa striatus* extract), a commercialized oral product group and a plain agar gel group. Assessment of the periodontal wound healing based on clinical assessments, gingivitis index, probing depth, recession, calculus index and histological healing changes were evaluated every week for one month. Treatments were stop for one month to monitor for any relapse of gingivitis. Gingival biopsy samples were taken on first, third and seventh day of *Channa striatus* extract treatment. There was a significant differences ($p<0.05$) in gingivitis index in all of the groups during treatment period. The experimental group showed faster improvement in gingivitis index compared to the commercialized oral product group. Histological healing score for gingival biopsy during third and seventh day of *Channa striatus* extract treatment showed increased in epithelisation, inflammatory cells, fibroblast, and collagen formation as compared with the biopsy before the treatment. *Channa striatus* is effective in reducing gingivitis index and promotes oral mucosal wound healing. This study showed promising alternative for treatment by using the natural product in cats oral health care.

VIABILITY OF RECONSTITUTED NEWCASTLE DISEASE LIVE VACCINE IN DIFFERENT TEMPERATURE AND TIME POINT POST RECONSTITUTION

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Vaccination is highly effective in preventing and controlling poultry diseases worldwide. Drinking water vaccination method is one of the common mass vaccination method in poultry farm. However, many factors that may have harmful effects on the live vaccine such as chemical residue, chlorine level, water hardness and water temperature.

In general practice, ice is used in order to keep the water temperature low and preserve the viability of the vaccine. The objective of this study is to evaluate the viability of reconstituted Newcastle disease (ND) live vaccine in different temperature and time point after being reconstituted. A commercial vaccine containing VG/GA- AVINEW strain was used in this study. Group 1 and 2, vaccine was reconstituted with chlorinated tap water pretreated with water stabilizer and maintained the water temperature in 26℃ and 6℃. Group 3, as a control, using phosphate buffered saline to reconstitute the vaccine and maintained in 6℃. Reconstituted vaccine was titrated and inoculated into commercial embryonated egg. 50% egg infectious dose of each diluent at certain time point from 0 to 120 minutes was determined.

The results showed there was no difference of vaccine viability post constitution in and maintained in ambient temperature or cold temperature. Although heat resistance between different ND strains was not studied in this experiment, the finding demonstrated that reconstituting vaccine with water temperature up to 26℃ has no significant negative impact on the viability of the ND live vaccine used in this experiment.

MARKET STRUCTURE OF LOCAL FRESH BEEF AND IMPORTED CARABEEF: A PILOT STUDY AMONG CONSUMER

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Availability, price and consumer preferences play an important role in determining the local fresh beef market and imported frozen buffalo meat. The purpose of this study was to determine the structure of the local fresh beef markets and carabeefs imported among consumers in terms of meat preferences, perceptions on both types of meat, and reasonable selling prices. A questionnaire was prepared and the survey was conducted in July 2018. For the purpose of pilot study, 22 respondents from various states of Peninsular Malaysia were involved in this study. The results showed that 27.3% of respondents bought meat from hyper or supermarket, 22.7% from public market (pasar awam) and night market (pasar malam) respectively, and 18.2% from farmer's market (pasar tani). Most respondents (68.2%) chose fresh beef compared with imported carabeef (27.3%). In terms of perception, respondents agreed that fresh beef had higher quality (59.1%) and better (54.5%) than carabeef. It is more expensive (54.5% respondents) because of their quality and suitability. Only 18.2% of respondents agreed on the availability of fresh beef in the market. The results also showed that 54.5% of respondents agreed that the current selling price was within reasonable distance.

THE PERFOMANCE STUDY OF ANAEROBIC DIGESTION SYSTEM FROM DAIRY CATTLE FARM

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Dairy farm effluent consists of the manure and urine excreted in the milking shed and yards, mixed with the wash-down water used to remove the waste from these areas and concrete yard runoff following rainfall. Therefore, there is a need to study the characteristics of dairy farm effluent and pollutants removal efficiencies. Environmental parameters such as Temperature, pH, Biological Oxygen Demand ,Chemical Oxygen Demand, Total Solids, Total Volatile Solids and Total Ammonical Nitrogen were carried out in this study. Effluent generated from 150 heads of cattle including 55 young cattle in the farm was channelled directly into collection sump through a bar screen then the slurry was pumped into inlet chamber from collection sump once daily. Effluent samples were collected from the manholes on a monthly basis and analyzed in the laboratory. Results shown that Biological Oxygen Demand and Chemical Oxygen Demand in the effluent removed up to 89.0% and 86.0% respectively wherеareas Total Ammonical Nitrogen slightly decreased to 46.0%. The performance of Total Solids and Total Volatile Solids was slightly decreased 12.0% and 22.0 % respectively. From this study, it can conclude that this method not only contributes to biogas production but also improved the quality of effluent from farm. However, the concentration of Biological Oxygen Demand ,Chemical Oxygen Demand, Total Ammonia Nitrogen,Total solids and Total Volatile Solids of the effluent quality studied exceed effluent quality discharge standard requirments of Department of Enviroment Malaysia. Therefore, there is a need of other method to polish the effluent for compliance.

EFFECT OF DRYING AND HEATING APPROACH TO THE NUTRITIONAL VALUE OF CORN IN ANIMAL FEEDSTUFF - A REVIEW

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Corn grain (Zea mays L.) is among the most widely produced grain in the world with roughly 7 to 11 tan/ha per year). Corn as major grains formulation in feedstuffs as a source of energy (carbohydrate) especially in poultry and pig industry. Generally, corn was fed as dry maize grain (less than 15% moisture) or high-moisture maize grain (22 to 28% moisture). In order to introduce corn grain as feed, it needs to be heated naturally or using hot air oven in order to get the needed percentage of moisture. As a result, such treatment could change the nutritional value of corn or brought out other effects that might influence the nutrition contents thus having effects on the animals such as retention (is this the right term?) of weight gain etc. This study focus on reviewing other research papers (reported or published online) with focus on corn grain as animal feedstuff especially for poultry and pigs. Online search were made on-well-known databases of animal feedstuffs. Any findings by researchers around the world were taken into consideration such as protein and amino acids structural changes in each corn grain, metabolites, and physical behaviour of subjected animals that would effects the animal bodyweight. Based on recent researches, it was discovered that drying without exceeding 150^{o}C (which may reduce nutritive values) is acceptable especially to pigs. Further study has to be conducted in local farm and feed miller to investigate the effect of both drying and heating method on the nutritional value of the feed.

THE IMPORTANCE OF INFECTIOUS BURSAL DISEASE (IBD) VACCINATION IN BROILERS: A CASE STUDY OF SUBCLINICAL IBD.

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In today's modern trend of intense poultry farming and responsible antimicrobial usage, disease prevention strategies could not be more important. Subclinical IBD poses an important threat to health management as it is an immunosuppressive disease. This case study aims to highlight the importance of subclinical IBD, which often goes undiagnosed in most farming practices. The main complaint in such cases are higher late mortality. Despite subclinical IBD not being the main factor for late mortality, its resulting immunosuppression goes undetected and exacerbates the mortality of the birds. Two cases of subclinical IBD in broilers shared in this presentation. The primary complaint by the farmer was an increased mortality due to an unknown cause at 2 different ages. Clinical findings as well as post mortem revealed various non-specific findings such as bacterial infections. What lead to a suspicion of immunosuppression was a random screening for IBD via serology which revealed very high antibody titres for IBD despite showing no typical clinical signs or lesions for an IBD outbreak. Further diagnosis to confirm the presence of IBD infection via PCR is still pending This disease is present, overlooked. and poses a significant economic burden to poultry producers. As random screening strategies only help identify but not solve the problem, vaccination as a preventative measure is compulsory. With the development of immune-complex IBD vaccine, it is even possible to stop the cycle of Gumboro virus in the field. A few of these methods are discussed as an end note.

MORPHOLOGICAL CHARACTERISTICS OF SHAMI GOAT IN TWO FARMS IN MALAYSIA

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Shami goat is a dual-purpose goat originated from Syria and widely spread into Mediterranean countries. Previous study on morphological characteristics have been done on the first batch of Shami goat imported to Malaysia in 2009. The objective of this study was to evaluate the current status of the morphological characteristics of Shami goats born in Malaysia under full intensive farming system. A total of 239 goats were sampled and thirteen morphological traits were studied; i) coat pattern ii) coat colour iii) skin type iv) fibre type v) hair type vi) hair length, vii) horn, viii) horn shape ix) horn orientation x) ear type xi) eye colour xii) beard xiii) wattle; were observed. The results indicated that 99.6% of coat pattern were plain while others were patchy. The coat colours were 50.2% brown, 43.5% dark brown, 3.3% black, 1.7% light brown and 1.3% fawn. All skin type were not pigmented. All goats showed cashmere fibre-type. All goats displayed a straight-long hair type. 59.3% displayed long, 30.7% medium and 10% short hair length. 87.3% showed presence of horn. All goats showed a curved-shaped horn, with 98% backward, 1% sideward and 1% forward horn orientation. All goats displayed pendulous ear type. The goats showed various eye colour (38.8% cream, 29.7% light brown. 17.2% brown, and 14.2% brown). 28.9% were bearded and 44.7 % showed presence of wattle. As a comparison with the previous study, Shami goat showed differences in percentages of certain morphological traits as compares to the first batch arrived in Malaysia.

COMPARISON OF FAECAL PRESERVATION AND EXTRACTION METHODS EMPLOYED IN FAECAL PROGESTAGEN ANALYSIS IN COWS

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Since the development of non-invasive methodologies in monitoring reproductive function in animals, several protocols have been established. However, such methods need to be validated in each species. This study was designed to determine the stability of progestagens in unpreserved faeces, compare the concentration of progestagens under different drying temperatures (50, 70 and 90 °C) and to compare the concentration of progestagens in fresh and oven-dried faecal samples. Faecal samples were collected from pre-selected pregnant (n=8) cows. Plasma was obtained after centrifugation of blood samples at 1500 g for 15 minutes. Faecal progestagens were twice extracted from a 0.25 g of dried faecal sample using 3 mLs diethyl ether and 2 mLs distilled water. Both faecal extracts and plasma samples were assayed using radioimmunoassay. The results shows that faecal progestagens concentration was seen to rise from 29.37±37.07 ng/g at 0 hrs to maximum values of 86.23±73.20 at 48 hrs and thereafter declined to 46.12±38.04 ng/g after 216 hrs (9 days). Although there was no statistical significant difference (p=0.399) in the concentration of progestagens dried under the three temperatures, a higher concentration of faecal progestagens was found in faecal samples oven dried at 70 °C (9.33±5.86 ng/g). There was however no significant difference between progestagens concentrations in dried or fresh samples. This study validates the use of faecal progestagens in monitoring reproductive function dried at oven temperatures of 70 °C with samples processes as soon as they are obtained.

Keywords**:** Faecal extraction, preservation, progesterone metabolites, radioimmunoassay.

LEPTOSPIROSIS AWARENESS AMONG WORKING DOG HANDLERS IN MALAYSIA

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Occupations with constant contact with animals such as the working dog handlers were at high risk of exposure to canine leptospirosis. This study determine the level of knowledge and awareness towards leptospirosis among working dog handlers and investigated the level of preventive practice towards leptospirosis among the working dog handlers. A total of 128 working dog handlers (respondents) were recruited in this awareness program intervention. A validated questionnaire were distributed prior to- and after the intervention. Data such as demographic characteristic, the level of knowledge and awareness towards leptospirosis, the ability to identify clinical sign towards leptospirosis and information on the level of preventive practice towards leptospirosis were obtained and analysed. Majority of the respondents (n=128) had some knowledge and awareness towards leptospirosis. The level of knowledge, awareness and their ability to identify clinical signs of leptospirosis increased significantly (P=0.001) after intervention. Respondents have sufficient preventive practice but has unsatisfactory attitude towards preventive practice (PPE) as there almost 50% of the respondents whom does not always apply appropriate PPE during work.

Keywords: Leptospirosis, knowledge, awareness, preventive practice, working dog handlers, awareness intervention

ECHOCARDIOGRAPHIC SURVEY OF THE PREVALENCE CARDIAC CONDITIONS IN DOGS IN MALAYSIA

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Globally, myxomatous mitral valve degeneration (MMVD) and dilated cardiomyopathy (DCM) are reported to be the common cardiac conditions affecting dogs. In Malaysia, however, there is currently scarce literature on the prevalence of the disease in canine patients despite routine cardiac examinations in various veterinary practices. This study was aimed at determining the prevalence and distribution of cardiac diseases in dogs in Malaysia as diagnosed by echocardiography. A two-year retrospective study of 264 cases of canine cardiac conditions diagnosed in Animal Medical Centre, Kuala Lumpur between 2015 and 2017 was obtained from archived patient medical records. MMVD and DCM accounted for 66% and 5% canine cardiac diseases diagnosed in the centre respectively while other conditions accounted for 20%. Echocardiographic signs of MMVD were based on thickened mitral valve, mitral regurgitation into left atrium, dilation of left atrium and fractional shortening while DCM's were based on left ventricular internal dimensions and fractional shortening. Age and breed were strong risk factors associated with the prevalence of both conditions amongst dogs in Malaysia while sex had minimal associative risk. This study has thus provided baseline information on the prevalence of canine cardiac conditions routinely diagnosed via echocardiography and their associated risk factors. A more rigorous and detailed study involving other risk factors and larger sample size is required for a detailed overview of the distribution and epidemiology of canine conditions in Malaysia.

Keywords: Myxomatous Mitral Valve Disease, Dilated Cardiomyopathy, echocardiography, dogs, prevalence, Malaysia

SUB-ACUTE TOXICITY STUDY OF Moringa oleifera HYDROETHANOLIC LEAF EXTRACT IN ICR-MICE

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Moringa oleifera Lam is widely used in traditional medicine. The toxicity evaluation of ethanolic leaf extract of this plant in mice is not reported. This study investigated the oral sub-acute toxicity effects of *M. oleifera* hydroethanolic leaf extract (MOHE) in ICR mice. A total of 25, 8-week old female mice were equally divided into five groups; A (control), B (125 mg/kg), C (250 mg/kg), D (500 mg/kg) and E (1000 mg/kg). The extract was administered orally daily for 28 days. The mice were closely monitored and sacrificed at day 29. Blood samples were collected for haematological and biochemical analyses. Liver and kidneys were also collected for histopathological evaluation. The results did not show significant alterations in the body weight, relative organ weights and haematological parameters between groups. Conversely, there were significant ($p<0.05$) increase in the level of ALT in group D (515.70±153.11 U/L) and insignificant ($p>0.05$) decrease in group E (144.20±45.69 U/L) compared to control (169.40±55.03 U/L). There was also significant ($p<0.05$) increase in creatinine level in group E (34.20±1.66 µmol/L) compared to control (18.80±1.62 µmol/L), as well as a significant ($p<0.05$) increase in CK in group D (1666.60±263.16 U/L) compared to control (546.20±67.63 U/L). Histological evaluations revealed significant ($p<0.05$) hepatic and renal necrosis in groups D and E, compared to control. It is concluded that repeated oral administration of MOHE for 28 days induced hepatic and renal injuries at 500 mg/kg and 1000 mg/kg in female ICR mice.

Keywords*: Moringa oleifera, oral gavage, hepatic necrosis, hydroethanolic extract, histopathological evaluation*

ANTIOXIDANT AND ENDOTHELIAL PROTECTIVE EFFECTS OF EDIBLE BIRDS' NEST: A POTENTIAL SWIFT REMEDY FOR VASCULAR COMPLICATIONS IN DIABETES

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Increased oxidative stress by hyperglycemia is a major cause of endothelial dysfunction and vascular complications in diabetes mellitus[1]. This study examined the protective effects of hydrolyzed bird nest (HBN) against high glucose (HG)-induced endothelial dysfunction and oxidative stress in mouse aorta and human umbilical vein endothelial cells (HUVECs). Isolated aorta from C57BL/6J mouse and HUVECs were treated with HG (30 mM) in the presence of either HBN, sialic acid (SA), glibenclamide or apocynin. Vascular reactivity in aorta was measured using a wire myograph. The effects of HBN on reactive oxygen species (ROS) production and nitric oxide (NO) bioavailability were assessed by Western blot, 2',7'-dichlorofluorescin-diacetate (DCF-DA) and 4-amino-5-methylamino-2',7' difluorofluorescein (DAF-FM). HBN significantly reversed the endothelial dysfunction induced by HG in mouse aorta. In HUVECs, HBN treatment normalized HG induced ROS over-production of NOX2 and nitrotyrosine and reduction of anti-oxidant marker, SOD-1 as well as restored NO bioavailability. HG-induced endothelial dysfunction in the isolated mouse aorta and elevation of oxidative stress in HUVECs were also reversed by SA, glibenclamide and apocynin. In conclusion, our result demonstrate that treatment with HBN reduces HG-induced oxidative stress and increases endothelial NO bioavailability offering a potential dietary supplement to swiftly ameliorate vascular complications in diabetes. (194 words) References 1. Pitocco D, Tesauro M, Alessandro R, Ghirlanda G, Cardillo C: Oxidative stress in diabetes: implications for vascular and other complications. International journal of molecular sciences 2013, 14(11):21525-21550.

COMPARATIVE PATHOGENICITY OF MALAYSIAN ORF VIRUSES IN MOUSE AND RAT ANIMAL MODEL

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Many aspects of the complex host virus interactions in course of Orf virus infection remain unclear. Simulating orf virus infection in animal models is hampered by challenges. In this study we demonstrated on the pathogenicity of Orf virus in mice and rat to determine the best suitable model which could provide a useful information for future studies in its natural host. Four viral isolates from different region in Malaysia were selected identified by a combination of methods indirect immunoperoxidase test, indirect immunofluorescence test, polymerase chain reaction, and DNA sequencing. Intradermal inoculation of Malaysian Orf viruses in Balb/c mice and SD rats produced gross lesions, erythema, macule, papule and scab. The histopathological lesions produced is characterized by keratosis, acanthosis and ballooning degeneration. Significant high antibody response in the experimental animals was determined using ELISA. Considering the conflicting results for orf virus pathogenesis in animal models, our discoveries permitted us to speculate that Malaysian Orf viruses mounted normal responses mimicking the course of disease in its natural hosts. UPM1/14 isolate produced highest response therefore identified as most immunogenic for the potential use vaccination. Comparative studies of responses in both mice and rats revealed that mice were more susceptible to the infection by this isolate, thus it could be regarded as a suitable candidate that have potential application for protection against reinfection of the same animal would be versatile enough to be successfully used to immunize naïve as well as previously infected animals while mice will be a better choice for animal model.

SUBCHRONIC TOXICITY ANALYSIS OF MIXTURES OF Mariposa christia vespertilionis LEAF AND Morinda citrifolia FRUIT ETHANOLIC EXTRACTS IN MALE SPRAGUE DAWLEY RATS

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Mariposa christia vespertilionis (MCV) leaves and *Morinda citrifolia* (MC) fruits have acquired much attention among Malaysians, particularly cancer patients. Practitioners are concerned on the effectiveness and safety of the products and therefore the study aims to evaluate the toxicity effects of mixtures of MCV and MC in male Sprague Dawley rats in a 90-day subchronic oral toxicity study. A total of 36 rats were divided equally into six groups; control, 5% DMSO (vehicle), mixture of low dose MCV and MC (75 mg/kg), mixture of low dose MCV (75 mg/kg) and medium dose MC (125 mg/kg), mixture of medium dose MCV (125 mg/kg) and low dose MC (75 mg/kg) and mixture of medium MCV and MC (125 mg/kg). The extracts were orally gavaged daily for 90 days. At day 91, the rats were humanely sacrificed, and abnormalities in the blood profiles and organs were evaluated. There were no mortality observed in groups of rats received mixtures of MCV and MC. Weekly body weights, haematology and serum biochemistry also showed no significant ($P>0.05$) differences compared to control. However, significant ($p<0.05$) differences were observed for hepatic necrosis and number of activated kupffer cells in all herbal treated groups compared to control (from very mild to moderate scores). Kidneys showed significant ($p<0.05$) score for granular cast (very mild). In conclusion, mixtures of MCV and MC induced hepatotoxicity and renal toxicity, and the no-observed-adverse-effect levels (NOAEL) of MCV and MC mixture is lower than 150 mg/kg.

Keywords: *Mariposa christia vespertilionis, Morinda citrifolia,* subchronic toxicity

ePOSTERS

SEQUENCE ANALYSIS OF S1 GENE OF ATTENUATED MALAYSIAN QX-LIKE AND VARIANT STRAINS OF INFECTIOUS BRONCHITIS VIRUSES

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Infectious bronchitis virus (IBV) is the causative agent of infectious bronchitis (IB) disease in chickens. IBV preferentially causes respiratory disease, but can also infect other organs, such as kidney, gut and reproductive tract. Although live attenuated and inactivated vaccines are used in controlling IB, the protections gained by use of vaccination can be lost because of the presence of a different IBV serotype that is not related to the vaccine used. In Malaysia, IBV infections are associated with respiratory distress, nephropathy and mortalities which attributed to the circulation of QX-like and variant strains. In this study, the complete S1 sequences of Malaysian QX-like (IBS130/2015) and variant (IBS037A/2014) wild-type and attenuated in embryonated SPF eggs at passage 70 were analysed using MEGA6 software. Several nucleotide deletions were detected throughout the S1 gene of the attenuated strains of both isolates. Attenuated IBS130/2015 has more nucleotide deletions than the attenuated IBS037A/2014. On the other hand, the attenuated IBS037A/2014 has more nucleotide insertions than the attenuated IBS130/2015 isolates which has one nucleotide insertion. Statistical analysis based on Z-test indicated significant differences in the nucleotides were detected in the attenuated IBS130/2015 ($p=0.00$) but no significant differences in the attenuated IBS037A/2014 ($p=0.93$) when compared to the wild-type strains, respectively. Further analysis based on the deduced amino acid sequences indicated that the attenuated IBS130/2015 has a higher number of amino acid variations (17%) compared to the attenuated IBS037A/2014 amino acid sequence variations (9%). Further study in characterizing the attenuated viruses based on pathogenicity study is currently underway.

FIRST DETECTION OF BOVINE VIRAL DIARRHEA VIRUS IN SWINE FROM MALAYSIA

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Bovine viral diarrhea virus (BVDV) naturally infects cattle and results in mucosal disease, acute infections of respiratory system and gastrointestinal tracts and reproductive disorders. However, since 1973, the host range of BVDV has been found to extend to swine, sometimes causing symptoms mimicking those of Classical Swine Fever Virus (CSFV). We report the first detection of BVDV in swine from Sabah, Malaysia. A pooled swine tonsils were received by Veterinary Research Institute (VRI) on June 2017 for CSFV surveillance and detection was carried out using reverse transcriptase polymerase chain reaction (RT-PCR). A 288 bp amplicon from the 5' untranslated region (5' UTR) of the genome was successfully amplified using primers 324 and 326. Purified amplicon is further sent for sequencing for virus confirmation. Phylogenetic analysis of the sequencing result was done by Neighbour-Joining method, with CSFV as an outgroup. Analysis comprised of additional sequences of BVDV-1 and BVDV-2 genotypes taken from GenBank and indicated that this virus clustered with BVDV-2. The virus sequence was deposited in GenBank with accession number MH814636. This finding may have important implications for the epidemiology, diagnosis and control of BVDV infection in the country.

Keywords: *Bovine viral diarrhea virus (BVDV), Classical Swine Fever Virus (CSFV), reverse transcriptase polymerase chain reaction (RT-PCR), Phylogenetic analysis*

STUDY ON BACTERIOSTATIC AND BACTERICIDAL ACTIVITY OF Piper cubeba L. EXTRACT AGAINST Escherichia coli IN RAW CHICKEN MEAT

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Traditionally, *P. cubeba* L. was globally acknowledged as flavoring ingredients in food and widely used in meat marination. Nutritional properties and antimicrobial activity of the spice was reported scientifically in various researches. In this study, the aim is to determine the antibacterial potential of the ethanolic extract against *Escherichia coli* in raw chicken meat. Disc diffusion assay was done, and the bacteriostatic and bactericidal activities were determined by using minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) test. The inhibition zone was recorded at 8.4 ± 0.1 mm, while the MIC and MBC were resulted at 0.625 ± 0.000 mg/mL and 1.250 ± 0.000 mg/mL respectively. Time-kill curve assay was conducted, and the result shows the killing time of *E. coli* was at 2 MIC (1.250 mg/mL) for four hours. Application of the extract at four different concentrations (0.00%, 0.05%, 0.50% and 5.00%) and filter tap water on raw chicken meat samples at 5 and 10 minutes exposure times during 14 days of storage at 4°C and -18°C shows significant ($P < 0.05$) reduction of *E. coli* count. The optimum conditions for antibacterial activity of the extract were observed on the samples treated with 5.00% concentration stored at -18°C for 14 days. Findings show that *P. cubeba* L. can be suggested as one of the alternatives to reduce the bacterial load of raw chicken meat prior to cooking. Application of the extract helps in ensuring food safeness and reducing the occurrence of foodborne poisoning associated with chicken meat.

DRY MATTER YIELD AND CHEMICAL COMPOSITION OF THE WEEDS IN INTEGRATED FARMING

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There are several type of the weeds that are potential as feed in livestock integration system but less study were conduct to determine the dry matter yield and chemical composition of the weeds. The objectives of this study is to determine the dry matter yield and chemical composition of the weeds found in integrated farming. There are two dominant weeds species during the sampling process: Slender Panic grass/Pait grass (*Ottochloa nodosa*) and Asystasia grass (*Asystasia gangetica*). Both cut weeds were weighed to determine the yield. Samples were sent to laboratory for proximate analysis. Study showed that, the dry matter for Slender Panic grass and Asystasia grass are 21.5% and 11.5% respectively. While the dry matter yield for Slender Panic grass is 216 kg/acre, lower than Asystasia grass, which is 587 kg/acre. Meanwhile, the results of the chemical compositions found that TDN and ME of Asystasia grass were higher than the Slender Panic grass. TDN value for Slender Panic grass is 52.3% and Asystasia grass is 55.7%. Metabolism Energy value for Slender Panic grass is 7.72 MJ/kg and Asystasia is 8.28 MJ/kg. Asystasia grass contain higher CP value which is 23.5% compare to 20.2% in Slender Panic grass. Based on this study, dry matter yield of Slender Panic grass is relatively low compare to Asystasia grass. While, the chemical composition of the weeds analysed in this study, contains high nutritional value and could fulfilled the livestock requirement.

EFFICACY OF ANTHELMINTIC TREATMENT TO CONTROL PARASITES

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The trials of FECR were conducted on sheep in the Veterinary Institute, Kluang. A total of 60 weaned sheep were selected and divided into six (6) groups. Group A was treated with ivermectin (0.5 ml / 25 kg of body weight), Group B received closantel (1 ml/5 kg of body weight) , Group C was treated with fenbendazole (6 ml/25 kg of body weight), Group D was treated with levamisole (5 ml/10 kg of body weight), Group E was treated with Cydectin (1 ml/5 kg of body weight) and the remaining 10 were untreated controls. Anthelmintic drugs were administered orally except for Ivermectin and closantel were administered by subcutaneous injection. Faecal samples were collected from each sheep before treatment and repeated on day 14, 30,45 and 60 post treatment. The worm egg counts were estimated by using McMaster's method. The results of anthelmintic tests were calculated from the mean number of eggs per gram for each group. The percentage reduction in the faecal egg count was calculated using the change in faecal egg count of the control group as a correction factor. The population of worm was classified as resistant if the adjusted percentage reduction was less than 90%. It is concluded that only levamisole can be used for helminthiasis control. The results showed that worms was suspected to be resistant to Ivermectin, Closantel , Cydectin and totally resistance to fenbendazole. The strongyle population is mainly made up of 80% *Haemonchus contortus* and 20% of species were *Oesophagostomum* and *Bunostomum.*

BETTER YIELD AND NUTRITIVE VALUES OF TAIWAN NAPIER GRASS BY USING VERMICOMPOST AND COMPOST FERTILIZER

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This trial was conducted to study the effects of vermicompost and compost on the quality and productivity of Napier Grass (*Pennisetum purpureum* cv. Taiwan). Nine forage plots (three forage plots on vermicompost treatment, three forage plots on compost and three forage plots on control treatment) were established. Applications of 5 metric tonnes per hectare vermicompost and compost were used. The grasses were cut close to the ground level (10cm) to get a uniform stand on day 75 after planting and then the cutting treatments at the interval of 42 days were carried out for 6 times. After each harvest, the rates of maintenance fertilizer used were 150 kg of nitrogen, 60 kg of phosphorus and 100 kg of potassium per hectare. Random samples of Napier was sent to laboratory for proximate analysis. The data was analyzed using Statistical Analysis System (SAS) followed by t-Test post-hoc test. For dry matter yield, treatment of vermicompost and compost seems not significantly different (5.03 and 5.51tonnes/ha/harvest respectively) but compare to control (4.04 tonnes/ha/harvest) it shows significant difference. There was significant difference ($p<0.05$) for crude protein for both treatment compare to control. CP for Napier treated with vermicompost is 15.87% and compost treatment is 15.77% compare to control which is 12.26% only. As for metabolized energy, Napier treated with compost shows highest result (8.53%) compare Napier treated with vermicompost (8.29%) and control (8.19%). Based on the analysis, this study proved that the use of organic fertizer can improve significantly the yield of Taiwan Napier grass.

NEOSPORA SPECIES INFECTION IN A HERD OF DAIRY CATTLE

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Neosporosis caused by *Neospora caninum* is one of the common causes of bovine abortion. It may infect domestic (dogs, cattle, sheep, goats, water buffalo, horses, chickens) and captive animals (deer, rhinoceros, rodents, rabbits, coyotes, wolves, foxes). A dairy cattle herd in Hulu Selangor had cattle abortion and mortality over a period of few months. Samples of aborted fetus, faecal, blood and organs were collected for thorough disease investigation. Sera samples were tested for seroprevalence of Neosporosis in dairy herds. Sixty (60) sera samples were tested for *Neospora caninum* using commercial Indirect Immunofluorescent Antibody Test (IFAT) test kit from VMRD™. Results showed that only two sera were positive for *Neospora caninum* antibody. However, animals which were having an abortion were negative for *Neospora caninum* antibody. Therefore, further disease investigation should be ruled out on the farm to know the causes of abortion and animal mortality.

Keywords: *Neospora caninum*, cattle, indirect fluorescent antibody

WOUND HEALING ACTIVITY OF Spirulina Platensis EXTRACT ON DIABETIC RATS.

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Diabetes mellitus, which impairs wound healing process, is associated with the increment in pro-inflammatory cytokines at the wound site.*S. platensis* was reported to possess anti-inflammatory property and enhanced wound healing in rats. Syarina et al. have demonstrated that *S. platensis* aqueous extract enhanced proliferation and migration of human dermal fibroblast (HDF) cells on scratch assay when compared to methanolic and ethanolic extracts. Thus, this study was conducted to investigate the effect of *S. platensis* aqueous extract topical application in accelerating the wound healing in streptozotocin-induced diabetic rats. Full-thickness skin wound was experimentally created by using 8 mm punch biopsy in male *Wistar* rats. Group 1 (normal rats with wound) and Group 2 (diabetic rats with wound), were left untreated and served as control. Diabetic rats of Group 3 and 4 were topically treated with 100 mg/kg and 200 mg/kg of *S. platensis* aqueous extract, respectively. Group 5 animals served as the reference standard and treated with allantoin. Extract-treated animals in group 3 and 4 exhibited 78% and 91% of wound contraction on day 14 respectively, compared to diabetic animals which were only at 53%. Significant decreases in pro-inflammatory cytokines (TNF-α, IL-1β and IL-6) level were observed after treatment of *S. platensis* aqueous extract. Histological examination of group 4 rats showed thicker re-epithelization and granulation tissue. *S. platensis* improved healing process in diabetic impaired healing and could potentially be developed as a pharmacological agent in clinical settings.

Keywords: *Spirulina platensis*, diabetic rats, wound healing, aqueous extract, pro-inflammatory cytokines.

NUTRITIVE VALUE OF CORN SILAGE

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Corn is one of the forages which is often used as silage and fed to ruminant animals. The good quality corn silage contains high energy and protein (average 8.1%). The keys for producing good quality corn silage are to ensure that corn is harvested at proper moisture content approximately 65% - 70%, filled rapidly and packaged well. The objective of this study is to determine the nutritive value of silage produced from grain corn. The corn was planted on April 2017 at Malaysia Veterinary Institute, Kluang Johor. It was harvested using corn harvester at 75 days after planting. The chopped corn was placed in a 9 tonnes capacity bunker; it was piled in a large heap and compressed using skid steer loader to purge as much oxygen as possible, then it was covered with a heavy plastic sheet and old tires. Fresh corn and 30 days ensilage corn was sent to a laboratory for proximate analysis. Dry matter (DM) of fresh corn is 32.2% with 9.6% crude protein (CP) and 10.67MJ/kg metabolism energy (ME). Meanwhile, the nutritive value of ensilage corn which is DM, CP and ME are 30.6%, 8.5%, and 10.14MJ/kg respectively, with TDN value 67%. The results also showed that pH of ensilage corn is 3.7 which is perfect pH for silage (range pH is 3.5 – 4.2). All nutrient contents of corn silage are slightly reduced compared to fresh corn but still preserved the values for animal's requirement and in the desirable range of target values.

FIRST REPORT ON IDENTIFICATION OF Pasteurella multocida serogroup F IN VETERINARY RESEARCH INSTITUTE (VRI), MALAYSIA.

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This paper reports on the positive isolation and identification of *Pasteurella multocida* serogroup F from a pig in Sarawak, Malaysia. In this case, a two years old Large White crossed Landrace female pig was reported thin and had multiple abscesses on the lungs. Upon isolation from the lungs, the grey and non-hemolytic bacteria colonies were identified as *Pasteurella multocida* by SVDL using a series of biochemical tests and were referred to VRI for serogroup identification. Molecular serogrouping work was carried out and identified the *P.multocida* belongs to the serogroup F. Since then, there have been a few sporadic cases of *P. multocida* serogroup F detected from various animals such as from chickens, goats and deer in West Malaysia in the recent year, this indicates that the *P.multocida* serogroup F is present in our country. In Malaysia, studies on the prevalence of *P.multocida* and predominant serogroups are available. However, *P.multocida* serogroup F is just briefly mentioned in those prevalence reports without any details of the history and further clinical description. Future research work is needed to understand the characteristics and pathogenicity by targeting the virulence factors (VFs) coding for outer membrane proteins, iron acquisition factors, bacterial adhesions and colonization factors, extracellular enzymes and toxins of the isolate, in order to understand the virulence of the serogroup F strain.

Keywords: *Pasteurella multocida,* serogroup F, pig, multiple abscesses, virulence

GROWTH PERFORMANCE OF CATTLE FED BY OIL PALM EMPTY FRUIT BUNCHES BASED FEEDSTUFF PRODUCE BY TWO DIFFERENCE METHOD

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Malaysia is rich with biomass sources from palm oil industry and agricultural waste such as palm kernel meal, palm oil mill effluent, palm fronds, oil palm empty fruit bunches, and others. Oil palm empty fruit bunch has low quality in terms of nutritional value, palatability and digestibility. Therefore, this agricultural waste is not suitable as a source of livestock feed like the other waste. The objective of this study is to evaluate the effect of different preparation methods of feed on the growth performance of feedlot cattle. A total of ten Mafriwal cattle were used in this study. The animals were divided into two groups and fed with diet containing 40% of oil palm empty fruit bunches and 60% feed based concentrate, given to Group A separately while Group B mixed together. The trial was conducted over a period of 90 days. There were no significant differences between Group A and B. At the end of the trial, the average weight, average daily gain (ADG), average dry matter consumption and feed conversion ratio (FCR) of cattle were 60.9kg, 0.68kg, 5.7kg and 10.29, respectively compared to 34kg, 0.38kg, 6.10kg and 16.45 in Group B. It can be concluded that 40% oil palm empty fruit bunches gave separately with concentrates show better performance to the cattle than those mixed together. Further studies have to be carried out to improve the method of preparation of oil palm empty fruit bunches in order to increase the acceptance of cattle for this agricultural waste source.

MICROBIOLOGICAL QUALITY OF LOCAL MILK AS ANALYSED BY REGIONAL VETERINARY LABORATORIES IN 2017

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Raw milk from local dairy farmers which were sent to Pusat Pengumpulan Industri Tenusu (PPIT)/ Milk Collection Centre will undergo platform tests prior for acceptance, then submitted to Regional Veterinary Laboratories for total plate count (TPC) test. Normally, TPC results were used for milk grading which determines the rate of payment to farmers. This study evaluated the percentage of raw milk samples with TPC results exceeding the limit to estimate the local milk quality. From January to August 2017, a total of 3,417 raw milk samples from 16 PPITs were analysed by four regional laboratories; Makmal Veterinar Kawasan Kuantan, Makmal Veterinar Kawasan Bukit Tengah (MVK BT), Makmal Veterinar Kawasan Kota Bharu (MVK KB) and Makmal Veterinar Kawasan Johor Bahru (MVK JB). About 70% of the samples were received and analysed by MVK JB as the state was having the highest number of dairy farmers. The normal limit for TPC in raw milk was $1x10^6$ cfu/ml, and a total of 48% (1,632 of 3,417) samples were having TPC results exceeding the limit. The highest percentage of samples exceeding it was that analysed by MVK JB (64%), followed by MVK BT (25%), MVK KB (4%) and lastly MVK Kuantan (1%). Results from this study indicates that the hygiene of local milk has to be improved to ensure good quality milk can be produced, which also could benefit the farmers with higher income. Besides that, it is suggested to harmonise the criteria for determination of the milk grade among regions to ensure standardisation.

IKTA QUAIL POPULATION AND PRODUCTION STATUS FROM 2011 – 2018

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Grand Parent Stock (GPS) IKTA Quail Farm was transferred from Institut Kemajuan Ternakan Ayam (IKTA), Johor to Institute of Poultry Technology (ITU), Melaka in 2010. Consequently, ITU has taken a role in supplying and producing DOQ (Day-Old Quail) to the parent stock farms. IKTA quail population is currently 1,596 birds consist of 532 birds of Male Line and 1,064 birds of Female Line kept in the closed-house with cages system. Selection programmed for the replacement and genetic conservation were made at 35 days based on the weight of 280 g and maintained up to 70 weeks. IKTA quail shows an efficient growth and production thus able to supply 136,000 DOQ to existing PS farms in the industry. To increased the productivity and efficiency of quail production, genetic stability research work need to be done and thereby enhance the growth of the country's quail breeding industry.

MOLECULAR CHARACTERIZATION AND PHYLOGENETIC ANALYSIS OF INFECTIOUS BURSAL DISEASE VIRUS FROM CHICKEN IN MALAYSIA

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Infectious Bursal Disease Virus (IBDV) is a highly contagious disease and can cause immunosuppression in chicken. Serotype I IBDV is continuously reported and can cause significant economic losses in Malaysia despite the implementation of the intensive vaccination program. In this study, six Malaysian IBDVs in 2018 were isolated and identified using Reverse Transcription Polymerase Chain Reaction (RT-PCR) based on the VP2 gene (hypervariable region). Phylogenetic analysis revealed that two isolates in this study were of very virulent IBDV (vvIBDV) strain and four isolates were of attenuated vaccine strains. In addition, amino acids A222, I256, I294 and I299 of VP2 gene are conserved among the previously characterized very virulent IBDV strains are also encoded by those two isolates. The two vvIBDV isolates were similar and clustered together with Malaysian and Japanese strains. Therefore, the present study has demonstrated the continuous circulation of vvIBDV strains in Malaysia. Hence, VP2 gene genetic characterization of IBDV strains is important for efficient diagnosis and disease control in poultry industries.

Keywords: Very Virulent Infectious Bursal Disease Virus (vvIBDV), Molecular characterization, Phylogenetic analysis, VP2 gene.

RABIES DIAGNOSTIC MANAGEMENT

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Rabies is a notifiable re-emerging fatal zoonotic disease of mammals, which becomes a global public health threat. Lately, multiple outbreaks in Perlis, Kedah, Penang (2015) and Perak (2017) affected the country's Rabies free status. Subsequently, Sarawak had its outbreak in July 2017 and has notresolved till this day. Perlis had also redeclared another outbreak in Jun 2018. Therefore, diagnosing Rabies effectively and accurately is important because laboratory results influence the decision of proceeding post-exposure prophylaxis (in human) and the decision on the need to institute elaborate measures for controlling an outbreak. With that aim, Rabies diagnosis/ confirmatory test is carried out in the National Reference Laboratory, Veterinary Research Institute, Ipoh. Direct Fluorescence Antibody Test, which is recommended by both WHO and OIE is used as a confirmatory test for the presence of Rabies virus antigen in a fresh brain sample. Autolysed brain samples will be subjected to RT-PCR for the detection of Rabies virus antigen. Virus isolation is carried out using Rabies Tissue Culture Infection Test in order to initiate with phylogenetic tree analysis and molecular epidemiology of a new outbreak. Thus, efficient case diagnostic management is crucial to ensure accurate and ultra-fast result reporting to the Veterinary Authority during an outbreak (and surveillance). Continuous epidemics in Sarawak warranted the Sarawak Authority to establish Rabies diagnostic laboratory in State Veterinary Diagnostic Laboratory to carry out routine rabies diagnosis. Yet, all positive cases are referred to VRI for confirmatory diagnoses. With that, VRI ensures the timely delivery quality services in the country.

HYGIENE AND SAFETY OF MEAT FROM LOCAL ABATTOIR: A SURVEY ON PUBLIC CONCERNS

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Greater urbanisation in Malaysia has led to raise in public health concern on food safety issue. Production of local meats (beef and mutton) in Malaysia are below 23% from self-sufficiency and depending on importation. This study was conducted as to investigate public concerns on hygiene and safety of meat from local abattoir since these factors play important roles to the growth of local meat industry such as upgrading abattoir facilities and focusing to local production than importation. Kuala Terengganu abattoir was selected in this study due to highest supply services to local butchers in Kuala Terengganu and Kuala Nerus. The total of 321 respondents consuming meat were randomly selected during buying meat at local meat retails. A structured questionnaire consisted questions regarding meat hygiene, safety concerns and knowledges on location and facilities provided by Kuala Terengganu abattoir was distributed to the selected respondents. The results showed that 62%, 25% and 12% of respondents were high, moderate and minimum concerns on hygiene and safety of meat, respectively. However, results on location and facilities of abattoir showed that 21%, 39%, and 40% of respondents had high, moderate and minimum knowledges, respectively. It was concluded that the public concerned about hygiene and safety while purchasing meat but their knowledges about location and facilities of abattoir were limited. By these, it also showed that our local abattoir has the capability to produce hygiene and safe meat to meet consumer demand, however promotion to the public will be benefit in helping local meat industry growth.

THE COMPARISON OF IMMUNE RESPONSE OF NEWCASTLE DISEASE VIRUS VACCINE IN SPECIFIC PATHOGEN FREE (SPF) AND VILLAGE CHICKENS

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Immune response of ND vaccine 1174/08 strain that was developed at Veterinary Research Institute (VRI) was tested. The objective of this study was to compare the immune response of SPF and village chickens to live ND vaccine 1174/18 strain (NDVAC-1174/2008). A total of nine SPF chickens and nine ND antibody negative village chickens which 14 and 20 days old respectively were vaccinated only once orally with a dose of $10^{6.5}$ / bird. The unvaccinated control group was inoculated with PBS via the same route. Serum samples from all group were collected weekly interval until 49 days of post vaccination (dpv). All serum sample was subjected for ND's antibody detection by Haemagglutination Inhibition (HI) test. No clinical sign and mortality were observed in vaccinated chickens throughout the trial. The result revealed that SPF chicken has 71.4 % (n=9) of HI titer $\log_2 \geq 3$ with the mean HI titer ($\log_2 \pm$ SD) 3.14 ± 1.78 at 7dpv and no HI antibody was detected in village chicken at the same dpv. However, village chicken showed 50% (n=9) of HI titer $\log_2 \geq 3$ at 14 dpv with the mean HI titer ($\log_2 \pm$ SD) 3.5 ± 2.27. No ND HI antibody was detected in the unvaccinated group. The results also showed that a single dose vaccination with a live NDVAC-1174/2008 was able to protect SPF and village chicken until 49 dpv with the mean of HI titer ($\log_2 \pm$ SD) 4.33 ± 0.5 and 4.38 ± 1.41 respectively.

Keywords: Immune response, Newcastle disease, NDVAC-1174/2008, Haemagglutination Inhibition (HI), Village Chicken, SPF Chicken

COMPARATIVE EVALUATION OF RBPT AND CFT FOR DETECTION OF BRUCELLA ANTIBODIES FROM RUMINANTS.

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Brucellosis is an economically important zoonotic disease which is endemic in many countries. The screening is based mainly on serological testing including Complement Fixation Test (CFT) and Rose Bengal Plate Test (RBPT). CFT is time-consuming and technically a complex test. Meanwhile, RBPT is a faster, simple plate agglutination test with low non-specific reactions. Previously, the Malaysian Department of Veterinary Services (DVS) uses the in-house CFT as confirmation of Brucellosis. Currently, DVS is using the commercial RBPT as a screening test before confirmation by CFT. In this study, 336 sera of ruminants from various farms throughout Malaysia were evaluated. From 336 sera, 245(72.9%) and 214(63.7%) were found to be positive by the RBPT and CFT, respectively. 205(61.0%) serum samples were found positive by both RBPT and the CFT. CFT detected Brucella antibodies in 9(2.7%) serum samples which were negative by the RBPT. 40(11.9%) serum samples which were found positive by the RBPT were found negative by CFT. By comparing the overall results, RBPT detects more positive samples than CFT. The present study showed a higher sensitivity but the lower specificity of the RBPT compared to CFT. Successful control programmes should be implemented based on the use of simple tests of high sensitivity, such as the RBPT then followed by confirmatory tests of high specificities, such as CFT. Precaution should be taken for animals found negative by the RBPT but positive to CFT.

Keywords: Brucellosis, serologic screening, Complement Fixation Test (CFT), Rose Bengal Plate Test (RBPT)

DEVELOPMENT OF BACILLI ID SYSTEM FOR BACILLUS SPECIES IDENTIFICATION IN VRI

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This paper reports on the development of Bacilli ID system, which is a formulated spreadsheet in Microsoft Excel to assist in *Bacillus* species identification. In VRI Bacteriology Laboratory, we received about 25,000 samples annually for bacterial isolation and identification tests. Under the genus *Bacillus,* there are 24 different species and require 14 different conventional biochemical tests to differentiate them by referring to Cowan and Steel's manual for the identification of medical bacteria. Previously, identification of the species was done by using repeated pencil marking on a printed copy of *Bacillus* spp. differentiation table. This manual way of working is troublesome, time-consuming, and most certainly have a higher probability of human error in data entry. Thus, an innovation idea came into place, which is to translate the paper-based differentiation table into Microsoft Office Excel. Biochemical tests results were keyed into the system, and the system will generate the highest matching score automatically to give the highest similarity of *Bacillus* species. This identification system was named as Bacilli ID and have been used in VRI Bacteriology Laboratory since the year 2017. Bacilli ID had shortened the time needed to identify the *Bacillus* spp. with a minimum human error. This system is also useful for less experienced staff as they might not be familiar with the complexity of the manual differentiation table. Last but not least, the *Bacillus* spp. biochemical characteristic database can be set up and maintained in a systematic database for analysis in future research work.

DETECTION OF AVIAN REOVIRUS IN COMMERCIAL BROILER-BREEDER CHICKEN IN JOHOR, MALAYSIA BY REVERSE TRANSCRIPTASE POLYMERASE CHAIN REACTION

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Avian reoviruses (ARVs) are members of the Orthoreovirus genus in the family Reoviridae. These viruses were recognized to be associated with many avian diseases such as tenosynovitis, respiratory and enteric diseases, hydropericardium, pericarditis, myocarditis and hepatitis which lead to significant economic loss due to loss of production, poor feed conversion, increased culling and carcass condemnations. The objective of this study which was conducted on April 2018 was to screen the presence of ARV's antigen in commercial broiler-breeder chicken flocks in Johor, Malaysia via Reverse Transcriptase Polymerase Chain Reaction (RT-PCR). The study population has been reported to show clinical signs such as lameness and stunting syndrome since 15 weeks old, in April 2017. The samples such as tendon, ceca tonsils and pooled organs (lung, liver, spleen, heart and kidney) were collected at four different processing plants to represent the overall population of the farm. A total of 40 tendons, 40 ceca tonsils and 40 sets of pooled organs samples were collected. All the samples were subjected to RT-PCR for ARV's antigen detection. Result shows that ARV was detected 70% (30/40), 50% (20/40) and 0% (0/40) from the tendons, ceca tonsils and pooled organs samples respectively. The resistance and pathogenicity of the virus probably be the reasons for the presence of the virus in tendon and ceca samples. In conclusion, vaccination programme against ARV infection in the study population is recommended to control the disease.

Keywords: Avian reovirus (ARV), *Reverse Transcriptase Polymerase Chain Reaction (RT-PCR), broiler-breeder chicken*

RETROSPECTIVE STUDY ON FOOT AND MOUTH DISEASE (FMD) POSITIVE CASES FROM 2014-2017 IN PENINSULAR MALAYSIA

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Malaysia had experienced Foot and Mouth Disease (FMD) outbreak as early as in 1909. Since then, the disease is endemic in Peninsular Malaysia until now. A retrospective study on the FMD vaccination and outbreak data from 2014-2017 was conducted to evaluate the vaccination and disease control program. From the data, a total of 93 FMD outbreaks (109 cases) were recorded from 11 states in Peninsular Malaysia. The highest positive cases of FMD were reported in Malacca (23, 21.1%), Pahang (16, 14.7%) and Johor (15, 13.8%). The outbreak occurred every year with the significantly irregular pattern, the highest cases reported in 2015 (35, 32.1%) and the lowest cases in 2016 (15, 13.8%), (P=0.022, F=3.337, df=3). The predominant species infected were cattle (96, 94.1%) followed by the buffaloes (5, 4.9%) and Seladang (1, 1.0%). Data also showed there was a significantly higher number of positive FMD cases in non-vaccinated compare to vaccinated animals (p=0.00, x^2=26.978). In conclusion, FMD is endemic in Peninsular Malaysia. Studies to evaluate the vaccine effectiveness, current vaccination program and the level of immunity conferred in vaccinated animals are essential for successful eradication of FMD in Peninsular Malaysia.

PROX'S SYSTEM SYSTEMATIC MANAGEMENT IN BIOCHEMISTRY LABORATORY OF VETERINARY SERVICES DEPARTMENT MALAYSIA

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Biochemistry Laboratory is one of the laboratories that conduct livestock nutrient analysis involving major nutrient analysis such as dry matter, protein, fiber, fat, total ash, nitrogen-free extracts, total digestible nutrients, metabolisable energy, neutral detergent fiber, and acid detergent fiber. The nutrient content analysis is an analysis based on chemical reactions from various feed samples through digestion, distillation, titration, extraction, combustion, drying and ultimately needs to be calculated to obtain a percentage of nutrient values before being reported to customers. This situation creates the idea of developing a PROXS System that manages complex information or data analysis in the Biochemistry Laboratory, Veterinary Services Department (DVS) systematically and strategically. This article explains the advantages of using PROXS Systems in the Biochemistry Laboratory of the DVS rather than a conventional system in the management of data and highly complex process. This system also assists in complex computation process in nutrient contents analysis, monitors ongoing analysis, stores analytical results data and transfers information automatically. The preparation of laboratory reports and future re-access can quickly be done too. Therefore PROXS System is more convenient and efficient system for Biochemistry Laboratory works in DVS.

EFFECTS OF NATURAL MATING AND ARTIFICIAL INSEMINATION ON PREGNANCY RATES IN SYNCHRONISED SWAMP BUFFALOES

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Buffaloes are hardy animals that can survive under rough condition and are known to be a slow breeder. Their poor reproductive performance has contributed to the reduction of ovulation, declining in the reproductive performance and thus affecting the calving rates. Therefore this study is conducted to assist in the improvement of breeding performances in swamp buffaloes in terms of pregnancy rates. A total of 30 female Swamp buffaloes were selected based on the predetermined criteria. They were divided into two groups and synchronised with *Ovsynch*. Group 1 (G1) were kept together with a bull for five days to allow natural mating while Group 2 (G2) were artificially inseminated using fresh semen from a bull in the same herd. Throughout the experiment, a total of four buffalo cows were excluded from G1 and G2. Pregnancy Diagnosis performed 45-60 days post mating showed that 23.1% (n=26) of the animals were pregnant with 50% (n=12) of females in G1 were pregnant and no pregnancy detected in the females in G2. Pregnancies were observed in females aged above four years old weighing about 350 kg and had at least calved once before. These may contribute to the difference in the outcome of the study as all female in G2 were still heifers when they were selected. Further studies are needed to be done to achieve a better reproductive performance of the swamp buffaloes.

RAPID AND SIMPLE APPROACH FOR IDENTIFICATION OF PASTEURELLA MULTOCIDA SEROGROUP A, B AND D BY DIRECT PCR FROM COLONY

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Pasteurella multocida and its serogroups is an important zoonotic pathogen which can have a considerable impact in livestock as well as damaging economic impact. The infection of this bacteria can cause a range of diseases to wild and domesticated animal as well as human. This study aimed to identify the Pasteurella multocida species and its serogroup A, B and D by conventional biochemical test and direct polymerase chain reaction (PCR) from pure colony. The results for conventional biochemical test were compared with PCR technique. The result showed that all the P. multocida genus and its serogroup A, B and D were identified by both technique and give the same results as comparison. Only a single serogroup were detected by PCR for each isolate proves that the primers were specific. This study report that PCR directly from colony is specific and comparable to conventional biochemical test with sugar fermentation test. Identification of P. multocida will become more efficient, fast and convenient due to direct PCR from colony.

A CASE REPORT OF ACUTE HAEMORRHAGIC PANCREATITIS IN BARKING DEER *(MUNTIACUS MUNTJAC)*

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Acute pancreatitis is a necrotizing inflammation of the pancreas which is most common reported in cats and dogs, however seldom in barking deer. This is the case report on acute haemorrhagic pancreatitis occurred in barking deer, *Muntiacus muntjac* at Bangas Wildlife Conservation Centre (WCC) Air Bangas, Johor. Arau is a male barking deer aged 13 years-old was reported bright, alert, responsive and good appetite two weeks before found death. Prior to death, clinical signs such as cloudy eye, hyper salivation, inappetance, dull and depress were observed. Treatment was instituted in accordance to these problems and he showed some improvement but prognosis was poor at this time. Unfortunately, he was found dead on 30th March 2017 and post mortem was done. The gross lesion of haemorrhagic pancreatitis was present at autopsy. There was engorgement blood vessels,enlarged pancreas with firm structure, size of tennis ball filled with fibrin-like material in some of the pancreatic ducts. Histopathological examination of pancreatic tissue revealed oedema, acinar cell necrosis, typical for acute pancreatitis. Bacterial isolation was not significant for any pathogenic bacterial infection. With this conclusive evidence of histopathology, the cause of death was due to acute haemorrhagic pancreatitis. The exact causes of this condition is in this case is unknown. However, it could be caused by fatty meal, corticosteroid administration, chronic kidney/liver disease, trauma or contaminated food/water or it could be due to infection such as Viral Hepatitis, Mycoplasma pneumonia and ascaris. The study on pathological changes in the pancreas of wild animal deserve more study.

A CASE REPORT ON THE OUTBREAK OF FOOT AND MOUTH DISEASE IN A CAPTIVE MALAYAN GAUR POPULATION

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This is a case report on the foot-and-mouth disease (FMD) outbreak that occurred within a population of captive Malayan Gaur in Malaysia. In November 2016, a juvenile male Malayan Gaur exhibited copious hypersalivation with no appetite loss at the Malayan Gaur Wildlife Conservation Center in Jenderak Selatan, Pahang with a recent history of translocations and an on-going outbreak of the said disease among the domestic livestock population within the vicinity of the Center. Physical examination under sedation revealed lesions that concur with the clinical form of the disease whilst further investigation of two other individuals exhibited the same lesions that are highly suggestive of the disease. Samples were positive for foot-and-mouth disease serotype O via ELISA, thus triggering disease control response measures which include increasing biosecurity measures on the said population and halting unnecessary traffic of humans into and within the Center. Herd immunity was established one month after the last clinical case via vaccination which was then incorporated as part of the herd's preventive healthcare. This report highlights the importance of potential disease spill-overs between livestock and wildlife population.

MYCOTIC ENCEPHALITIS AND PULMONARY- NEPHROMYCOSES INFECTION IN IRRAWADDY DOLPHIN- A CASE REPORT

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Irrawaddy dolphin also known as *Orcaella brevirostris* was listed as critically endangered species in t he whole world by The World Wide Fund for nature (WWF) (Elliot et.al, 2009). On Feb 2017, a carcas s of male Irrawaddy Dolphin ,weight 120 kg with 2 meters length was found stranded at Pantai Pusat Perdagangan Pontian,Johor. Post mortem examination has done *insitu* revealed nodule in the apical lobe of lung, hydrothorax, severe haemorrhage (paint brush haemorrhage) of cerebrum, renal cong estion, hepatic congestion, and muscle hematoma at the back of the head. *Aspergillus flavus* was isol ated from the lung and kidney, *Geothricum candidum* from brain and *Pasteurella ureae* from all orga ns. Histopathological finding showed vasculitis in the brain, kidney, liver and forestomach, presence of fungal hyphae in the blood vessel and penetrate into the cerebrum. The fungal hyphae also detect ed at the interstial cell of kidney. This is the first reported case of mixed fungal infection in the Irraw ardy Dolphin in Malaysia.

INCIDENCE OF *LISTERIA MONOCYTOGENES* IN DAIRY AND FOOD PRODUCTS OF ANIMAL ORIGIN IN CENTRAL REGION OF PENINSULAR MALAYSIA

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Listeria monocytogenes is a foodborne pathogen which causes listeriosis, an illness characterized by meningitis, encephalitis and septicemia, especially in immunocompromised individuals, elderly and pregnant women. It has been reported that several outbreaks of listeriosis were due to consumption of contaminated food products, such as dairy, meat, vegetable and seafood. *L.monocytogenes* is notable for its ability to grow at refrigeration temperatures, unlike most enteric pathogens. This has considerable significance for food safety as it means chilling to 4ºC could not be relied upon to prevent the growth of the organism to a dangerous level. The aim of this study is to determine the incidence of *L. monocytogenes* in selected food products of animal origin obtained from processing plants in Central Region of Malaysia. A total of 130 samples were collected during January to August 2018 from 19 processing plants in four states of Malaysia (Selangor, Negeri Sembilan, Melaka and Wilayah Persekutuan Kuala Lumpur). The food samples comprising of 30 dairy products (ice-cream, butter and cheese) and 100 meat products (smoked frankfurter, sausages, sausages and sandwich) were analyzed for the presence of *L.monocytogenes* using selective enrichment and isolation protocol. *L.monocytogenes* was not detected in any of the samples. More comparative studies are needed to detect the existence of this pathogen from a variety of food and the environment to ensure the importance of implementing appropriate prevention and control measures that will help to prevent *L. monocytogenes* food contamination in the manufacturing environment.

Keywords: *Listeria moncytogenes*, incidence, processing plants, dairy products, meat products.

PRELIMINARY STUDY ON NATURAL OCCURRENCE OF AFLATOXINS, ZEARALENONE AND FUMONISINS IN GRAIN MAIZE GROWN IN PENINSULAR MALAYSIA

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The maize plant and kernel are prone to infection by fungal attack and are most likely to be contaminated with mycotoxins under suitable temperature and humidity conditions, during both the growing and storage period. The aim of this study is to evaluate the occurrence of aflatoxins, zearalenone and fumonisins in grain maize grown in Peninsular Malaysia. A total of 144 samples from Terengganu, Kedah, Pulau Pinang, Perak, Selangor and Johor were analysed for this study. Aflatoxins, zearalenone and fumonisins testing were carried out by fast screening method using ELISA technique (Ridascreen, R-Biopharm) with Ridasoft win software for quantification. Zearalenone were the most common toxins detected in all samples (68.9%) with values ranging from 62.5 µg/kg to 226.4 µg/kg, followed by fumonisins (34.5%) with values ranging from 0.6 mg/kg to 5.6 mg/kg and aflatoxins (26.4%) with values ranging from 5.2 µg/kg to 41.7 ug/kg respectively. The incidence of aflatoxins above maximum tolerable levels (MTL) >20 µg/kg was detected in 0.7% of the samples while no samples detected above MTL for fumonisins (>60 mg/kg) and zearalenone (>3 mg/kg). Overall, this study shows that there was minimum occurrence of mycotoxins contamination in local grain maize. This occurrence was considered to be safe for livestock consumption. For further study, more sample size is needed to ensure a better evaluation of occurrence rate throughout the whole country.

BIOGAS PRODUCTION FROM A SMALL HOLDER DAIRY FARM IN SELANGOR

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The growing interest in anaerobic biotechnology has been closely associated with the benefit of energy and nutrient recovery while achieving the objective of pollution abatement. The main reason for the breakthrough of the anaerobic waste treatment method presumably lies in the development and successful application of new, simple and less expensive anaerobic treatment processes. Biogas plants can be designed and constructed as big or small units as required depending on the amount of waste available and the volume of the gas needed. The objective of this experiment is to study the quantity of biogas (methane) production through anaerobic digestion. The farm candidate in this work was a small holder farm in Semenyih, Selangor Darul Ehsan with 40 heads of lactating cows. Underground farm-scale digester was constructed to study the potential of biogas (methane) production. The anaerobic digestion of dairy farm waste was performed at optimal condition with average temperature of 28°C and pH ranging from 6.5 to 7.6 in a $50m^3$ closed digester over three weeks period. The biogas produced was sampled using a gas sampling bag which was analysed periodically. Methane and carbon dioxide production were measured by injecting 1 mL of the headspace gas from each of the bag into a gas chromatograph equipped with thermal conductivity detector (TCD). Methane content ranged from 39% to 63% while the composition of carbon dioxide in the biogas mixture was between 18% to 39%.

PREDICTION OF METABOLIC BODY WEIGHT (MBW) USING GIRTH MEASUREMENTS FOR BALI AND KEDAH-KELANTAN CATTLE.

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A preliminary study was carried out to determine the relationship between body girth measurements and metabolic body weight (MBW) of Bali and Kedah-Kelantan (KK) cattle reared extensively in Muadzam Shah MARDI Research Station in Muadzam Shah, Pahang and Kemaman MARDI Research Station in Kemaman, Terengganu. Data was collected for body girth, and live weight in 138 Bali and 121 KK cattle. Live weight was converted to MBW, which was used in this analysis. Linear regression analysis was done to estimate MBW based on body girth measurement. The model for MBW of is MBW(Bali) = 0.60(girth) – 31.69, and which has an R square value 0.905, and MBW(KK) = 0.72(girth) – 46.40, with R Square value 0.944, for both Bali and KK cattle, respectively. Both show statistically significant ($P<0.001$). In conclusion, the model showed girth measurement is a potential as useful predictor of MBW in Bali and KK. Therefore, live weight can be predicted which using a single girth measurement tape that can be easily obtained in the field setting. This simple estimation-tool will empower local farmer to have better bargaining powers in selling their cattle.

USAGE OF BIOREACTOR IN PRODUCING SALMONELLA ANTIGEN AS A SALMONELLA BIOLOGICAL CONTROL IN POULTRY

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One of the effective methods controlling Salmonella in poultry is by regularly monitoring farm with salmonella antigen. As a step towards biomass production, this antigen has been optimized in bioreactor as an alternative from the conventional method that currently used in Veterinary Research Institute, Malaysia. This study aimed to optimize the growth of Salmonella enterica serovar Pullorum and Salmonella enterica serovar Enteritidis by utilizing bioreactor with commercialized media. It is hypothesized bacteria cultivation can be produced in a large scale, higher yield with lower risk of contamination in a bioreactor. Five strains are involved in this optimization process including four strains of S. Pullorum isolates (SP 9-25, SP 14/11, SP 690/79 and SP 7107/07) and one S. Enteritidis isolate (SE 8543/96). Each strains were successfully cultured in 3.6L bioreactor without contamination. Isolates were cultured in nutrient broth and incubated aerobically where aeration was supplied with sparger and rotor. The temperature was controlled using inlet water supply, while acidity and alkalinity were controlled using 2M hydrochloric acid and 2M sodium hydroxide respectively. The culture was monitored based on the enumeration using spectrophotometer at 600nm every two hours and each strain was harvested at optimum time. The growth of bacteria also was determined using spread plate technique before harvesting. High productivity without contamination makes the bioreactor a promising tool for the cultivation and study of salmonella antigen for industrial application. Keywords: S. Pullorum, S. Enteritidis, Salmonella antigen, bioreactor

DIAGNOSTIC INFORMATION OF PARASITIC INFECTIONS IN VARIOUS ANIMAL SPECIES AT REGIONAL DIAGNOSTIC LABORATORY BUKIT TENGAH FROM 2015 TO 2017

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Regional Laboratory Bukit Tengah (RLBT) was received samples obtained from various animal species as diagnostic cases which were sent from Perlis, Kedah, Penang and Northern Perak. Routine diagnostic tests were done to establish the incidence of positive infections in local farms by OIE recommended and prescribed test for international trade. In 2015 to 2017, a total of 241 cases (2015), 215 cases (2016) and 183 cases (2017) were received for parasitic cases. Over the past three year's period, a total of 2680 samples were found positive for various parasitic infections such as Helminthiasis (31.5%), Coccidiosis (16.5%), Leucocytozoonosis (13.5%), Anaplasmosis (7.8%), Theileriosis (3.9%), Avian Malaria (0.8%), Trypanosomiasis (0.6%), Babesiosis (0.3%), endo-parasite identification (1.6%) and ecto-parasite infection (3.1%). RLBT provided services and important information for assisting farmers with managing the health to maintain the productivity of animals and also to create awareness on monitoring the disease in early infected stage. An extension services of the Department of Veterinary Services recommend regular screening of livestock animals for parasitic infections to reduce losses caused by mortality and morbidity.

Keywords: *Parasitic infection cases, Regional Laboratory Bukit Tengah, Penang, Kedah, Perlis and Northern Perak*

MOLECULAR PREVALENCE OF BABESIA SPP. AND EHRLICHIA CANIS IN TICKS INFESTING SHELTER DOGS IN THE NORTH REGION OF PENINSULAR MALAYSIA

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Babesia spp. and *Ehrlichia canis* are among the most important tick-borne hemopathogens of dogs in Malaysia.. This study aimed to determine the prevalence of babesiosis and ehrlichiosis and its associated risk factors among randomly selected shelter dogs from north Peninsular Malaysia. A total of 65 blood samples were collected from shelter dogs in Society for the Prevention of Cruelty to Animals (SPCA) Penang, Ipoh SPCA Perak and Shelter for Abused and Abandoned Animals Kedah. After genomic DNA extraction, polymerase chain reaction assay was carried out using commercial PCR kit for the detection of *Babesia spp.* and *E. canis*. The results showed that only 13 out of 65 (20%) and 8 out of 65 (12.30%) were positive babesiosis and ehrlichiosis respectively. Samples from all three shelters contained *Babesia sp.* positive and the prevalence varied between 12 to 26.7%. Meanwhile, for *E. canis*, the prevalence varied between 4 to 20%. The prevalence of babesiosis did not show any significant difference between dogs of different gender, breed and tick presence ($p>0.05$ in each case). There was a significant ($p<0.05$) association between babesiosis to different age group. There was no significant difference among gender, age, breed and tick presence for *E. canis*. The present study revealed high molecular prevalence of babesiosis and ehrlichiosis as well as its associated risk factors among shelter dogs in north Peninsular Malaysia.

COMPARISON OF BACTERIA CULTURE AND POLYMERASE CHAIN REACTION (PCR) METHODS IN IDENTIFICATION OF CORYNEBACTERIUM PSEUDOTUBERCULOSIS IN CLINICAL SAMPLES FROM GOAT

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Corynebacterium pseudotuberculosis is responsible to cause Caseous Lymphadenitis (CLA) commonly in sheep and goat. Therefore, it causes major economic loss in small ruminant industry. Early detection is vital for the control and prevention steps of this disease. Currently, identification of *C. pseudotuberculosis* mainly depends on microbiological examination, followed by biochemical identification. They are fastidious organisms, growing slowly even on enriched medium. Hence to fasten the detection, polymerase chain reaction (PCR) technique was developed by targeting the gene of these bacteria which is phospholipase D (pld). In this study, a total of 7 pus samples from 7 goats were obtained from the nine semi-intensive farms involving the total population of 289 goats collectively. All the goats were clinically examined for the present of the abscessation on the external lymph nodes. The samples collected were further diagnosed with two techniques which are bacterial culture and PCR. Isolation via bacteria culture was carried out by using the blood agar made out of 5% defibrinated sheep blood, subsequently sub-culture into the Brain Heart Infusion agar (BHI) and biochemical test was conducted. The PCR method also been conducted to all the samples by using the specific primer for pld gene (band=203 bp). The study reveals that 6/7 (85.71%) of the pus sample were positive with *C. pseudotuberculosis* by bacterial culture while 7/7 (100%) of the pus sample were positive by the PCR. Hence, PCR can significantly improve rapid and sensitive *C. pseudotuberculosis* detection and could supersede bacteriological culture for microbiological and epidemiological diagnosis of CLA.

PET OWNERSHIP IN PUTRAJAYA

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The objective of the study was to determine the status of pet ownership among Putrajaya residence. The survey was administered by means of a questionnaire, either by face to face interview or online. A total of 594 residence participated in this survey. The result has shown that 47% of the household do keep animals as their pets. The most popular pets are cat (72%) and fish (14%). The most common sources of cats were the street, with 63% saying their cats were strays, 24% were acquired their pets through friends and families as a gift and pet shop (15 %). Almost 59% of the cats were desexed, 86% were not microchipped and 67% were not vaccinated. Almost half of the pet owners (53%) do not take their pet to the vet at all. Among those visited veterinary clinic, 68.7% opted for private animal clinic compared to 31% for government veterinary clinic in Cheras. The most common reasons for veterinary visit include health check-ups (47%), vaccinations (34%), surgeries (13%), microchipped (4%) and Pet Passport (2%). In term of pet-owning household expenditure, most (82%) of them spend an estimated RM1.00-RM250.00 per month on its pets, 45.7% on food, followed by veterinary services and products (27%), pet products and accessories (16%), grooming (8%) and boarding (3%) services.

LETHAL DOSE 50 TEST OF PASTEURELLA MULTOCIDA TYPE A IN MICE

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Potency test is mandatory quality control (QC) test in the vaccine production and involves using an animal model. Easy-to-manage animal mice have been selected as an alternative animal for potency testing of VRI's Duck Pasteurellosis vaccine. However, the infectivity dose of *Pasteurella multocida type A vaccine seed 5009 strain* (PMA5009) that produces lethal effects has yet to be determined in mice. Hence, this study was conducted to determine the lethal $dose_{50}$ (LD_{50}) of PMA5009 vaccine seed in mice. The PMA5009 vaccine seed was cultured from a freeze-dried working seed and incubated at 37°C overnight. 10-15 single colony were added in Haemorrhagic Septicaemia Broth (HSB) for further test. 52 two-month-old swiss albino mice were divided equally into 13 groups according to the dilutions series (neat to -12) and were inoculated subcutaneously with 0.5 ml of serial ten-fold dilutions of bacterial suspension. Mice were closely monitored for seven days. The dilutions were also subjected to total viable count for estimation of colony forming unit (cfu). The result indicates that a titration group of 10^{-9} contributed 50% of the mice mortality and is applicable in the vaccine potency test for QC test in vaccine production. The LD_{50} of 5.0×10^{-9} cfu/ml of PMA5009 strain was calculated using the Spearman×Kärber method. Unfortunately, the low titration of LD_{50} obtained could cause toxicity to the mice. Therefore, further experiment using a different animal model such as guinea pig can also be conducted in future.

Keywords: lethal dose 50, *Pasteurella multocida*, duck pasteurellosis

EVALUATION OF HAEMORRHAGIC SEPTICAEMIA VACCINES FORMULATED WITH MONTANIDE ISA 61 VG, CORONA 8-SO-(RB), DOUBLE OIL ADJUVANT, AND ALUM

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Selection of different formulations in vaccines production is important for safe and sound immunological response in animals. In this study, two new vaccine formulations, which consist of Montanide ISA 61 VG and Corona 8-SO-(RB), respectively were incorporated in preparing the haemorrhagic septicaemia (HS) vaccine. These vaccines were compared with the available HS double oil adjuvant vaccine (HSDA) and HS alum-precipitated vaccine (HSAP) in VRI. All the four vaccines were prepared to maintain the same amount of antigen in all four vaccine formulations. The vaccines were evaluated for their colour, pH, droplet size, stability, injectability and also for the cost of production of each vaccine in 1000 dose. Furthermore, efficacy and potency of the vaccines were tested in mice. Forty-eight mice were divided into 4 groups and injected subcutaneously with the Montanide adjuvanted vaccine, Corona vaccine, HSDA, and HSAP, respectively. After day 21 and 28, six mice from each group were challenged with 109 CFU/ml concentration of Pasteurella multocida serotype B, and the mortality rate was recorded. Results showed that Montanide adjuvanted vaccine is capable of initiating a quick immune response comparable to HSAP and the immunity in mice lasts for the whole experimental period comparable to Corona vaccine and HSDA. Hence, this study recommends Montanide adjuvanted vaccine as a potential candidate for the production of VRI's HS vaccine.

THE EVALUATION OF CUSTOMER SATISFACTION ON SERVICES OFFERED BY KUANTAN REGIONAL VETERINARY LABORATORY 2018.

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A survey was conducted to determine the customer satisfaction on services offered by Kuantan Regional Veterinary Laboratory for year 2018. The service evaluation was conducted once every 2 years.Review from 31 regular customers were collectedmanually by filling out the form starting from February to July 2018 with target customers from Department of Veterinary Service District of Pahang and also people from Private sector. The criteria of the survey includes registration forms, counter services, laboratory services, communications, suggestions and overall assessments. Based on the evaluation conducted, 29 customers responded to the evaluation out of 31.The survey also inquiries about the importance of feedback from the customers in ensuring laboratory competency can be improved. Based on the survey conducted up to 48% of the correspondent very satisfied with the service provided and another 52% is satisfied. Overall, through this survey the result indicate that most of the customer satisfied with the service provided by Kuantan Regional Veterinary Laboratory.

Keywords: customer satisfaction, services offered, criteria, satisfactory, assessments

ISOLATION AND DETECTION OF EQUINE INFLUENZA VIRUS IN NASAL SWABS FROM OUTBREAK CASES IN MALAYSIA

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Equine influenza virus (EIV) belongs to Influenza A group and causes respiratory syndrome disease in horses, leading to economic loses. The disease has a worldwide occurrence and is easily transmitted by direct contact with infected animals, fomites and aerosols. This study was proposed to utilize Specific Pathogen Free (SPF) eggs with the assistance of one-step reverse transcriptase (RT-PCR) assay to facilitate EIV isolation and diagnosis from field samples. A total of 547 nasal swabs from horses were received by Veterinary Research Institute from August to December 2015 with respiratory disease symptoms. Out of 547 samples tested, four were positive and further inoculated into the allantoic sac of the SPF eggs. The virus propagated and were characterized further using Haemagglutination (HA) test after five passages. Subsequently, viral RNA was extracted using Trizol and reverse transcribed. The 200 bp amplicon of EIV's matrix (M) gene were successfully amplified. These results indicated that SPF eggs with one-step RT-PCR could be used for EIV replication and diagnosis of field samples. Viable quantity and quality of infectious virus particles are crucial in disease diagnosis. Poor quality and low quantity of infectious virus particles can lead to difficulties in field virus isolation and diagnosis. Even though, influenza virus in SPF eggs is not applicable for rapid diagnosis nonetheless it allowed for the recovery and propagation of the viable virus. Keywords: Equine Influenza Virus (EIV), reverse transcriptase polymerase chain reaction (RT-PCR), specific pathogen free (SPF) eggs, virus isolation.

EDIBLE BIRD'S NEST (EBN) SUPPLEMENTATION ON COGNITIVE FUNCTION OVER TWO GENERATION MICE

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Edible bird nest (EBN) is well known as a natural food product rich in glycoproteins, minerals and carbohydrates. In mammals, the highest absorption of EBN occurs in the brain where it participates as an integral part of ganglioside structure in synaptogenesis and neural transmission. The active compound from EBN is a key component of mammalian milks oligosaccharides and important nutrient during periods of rapid brain growth particularly for preterm infant. While EBN dietary supplementation has been associated to enhance brain functions in infants, the effects of multiple generations of EBN on cognitive function are still remain unclear. The present study aims to determine the effects of EBN dietary supplementation on cognitive function of trans-generational mice. To address these issues, CJ57BL/6 breeder mice were fed with different sources of EBN (10mg/kg) by oral gavage. After 6 weeks of supplemented diet, all animals were tested with Y-maze brain cognitive performance. Then, all animals were bred to produce the first generation. At 4 weeks of age, the cognitive function of first-generation mice were performed by Y-maze test. Results showed that both generations mice on EBN supplementation improved cognitive functions due to the breeder mice synthesized the EBN which crosses the placenta to contribute fetal brain development in the third trimester. The HPLC results showed that all EBN groups contains glycoprotein with higher percentage of sialic acid. Thus, this study provide a solid foundation for the growing research of nutritional intervention from EBN on neurological and intellectual development for multiple generations in mammals.

IMPACT OF LAMENESS AND CLAW LESIONS ON DAIRY COW PRODUCTION AND NEED FOR APPROPRIATE PREVENTIVE MEASURES

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Aside being the greatest welfare problem affecting dairy cows, claw lesions causing lameness impact negatively on production. As such, production variables including milk yield, body condition, reproductive performance, and productivity lifespan have all been studied in relation to lameness in several studies. Although the mechanism involved in the association between lameness and production variables are not well understood, there are indications of such mechanism differing based on the specific claw lesion. Hence, there are disparities when comparing the findings between various studies, especially when clinical lameness rather than specific claw lesions is considered during animal enrolment. Other factors such as study design, definition, and methods of detecting of lameness are responsible for such discrepancies. In Malaysia, few studies conducted regarding claw health have shown that lameness is an important health problem in dairy herds in the region. However, farmers seem to underestimate lameness prevalence in their herds and vital preventive measures are often lacking. This review summarizes the recent findings from studies investigating the association between lameness and production measures with respect to specific claw lesions. Such information is pertinent in educating farmers on how the prevalent lameness problems in their herds affect overall production. This will assist to motivate farmers toward appropriate lameness preventive and control measures.

BLOOD PROTOZOAN INFECTIONS IN RUMINANT LIVESTOCK FROM 2011 TO 2017 – CHALLENGES IN DIAGNOSIS AND IDENTIFICATION

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A retrospective study was conducted to provide an update of the current status of important blood protozoan infections in ruminant livestock in Malaysia from January 2011 to December 2017. A total of 10,258 blood samples were examined for the presence of blood protozoan parasites, of which 4022 samples were from goats, 2820 from cattle, 1665 from deer, 1348 from sheep and 403 from buffaloes. The blood samples were submitted to the Veterinary Research Institute (VRI) Ipoh, Perak, from various farms in Peninsular Malaysia. Thin blood smear and Giemsa staining was carried out on each of these blood samples to confirm the presence of blood protozoan parasites. Out of 10,258 blood samples examined, 966 (9.42%) were found positive for blood protozoan infections. A total of 40.3% of all samples with *Theileria* sp. was found in samples of cattle and buffaloes, followed by 51.6% of all samples with *Trypanosoma* sp. was found in deer samples.
Meanwhile, *Babesia* sp., *Anaplasma* sp. and *Eperythrozoon* sp. were also found (0.72% in all ruminant species). A prevalence study on ruminant livestock should be carried out to estimate the importance of protozoan infections towards the mortality and morbidity of food animals. As such, the use of current methodologies such as serological or molecular methods is required to obtain a more accurate picture of the common species of blood protozoan parasites available in Malaysia. Thus, control and prevention strategies can be carried out more effectively to ensure that healthy animals will contribute to the healthy society.

SPATIAL ANALYSIS OF HIGHLY PATHOGENIC ASIAN AVIAN INFLUENZA A (H5N1) OUTBREAK IN KELANTAN, MALAYSIA FOR THE YEAR 2017

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Asian highly pathogenic avian influenza (HPAI) A (H5N1) virus occurs mainly in birds and is highly contagious among them. HPAI Asian H5N1 is especially deadly for poultry. This study examines the use of Geographical Information System (GIS) and describes the distribution of the location of the positive HPAI outbreak in Kelantan Malaysia as reported to the Department of Veterinary Services (DVS) For the year 2017. A total of 36 positive cases were detected involving 130 dead bird in 6 district of Kelantan. Emergence hot spot analysis was conducted using ArcGIS 10.2 software to show the overview of density and distribution of HPAI cases in Malaysia while time slider is used to visualized over time allowing a better understanding of the spread of the HPAI disease. The mapping approach provides a clear visual description of the distribution of the disease incidence in specific areas. It also could be used in the future for HPAI surveillance because of the ability to provide a baseline pattern of distribution and identifying possible disease clusters in the monitoring process carried out by DVS. Findings from this study could then be used to direct future research into the epidemiology of HPAI and could serve as a starting point for developing more effective control programs in this country.

Keywords: Avian Influenza, Spatial Statistical Analysis, Geovisualization

OCCURRENCE OF CAMPYLOBACTER JEJUNI IN CHICKENS AND ENVIRONMENT FROM ORANG ASLI VILLAGES IN SUNGAI SIPUT, PERAK, MALAYSIA

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Campylobacter jejuni are found to be the prominent bacterial causes of human gastroenteritis in developing countries and they also showed an increased trend towards antibiotic resistance. The study aimed to determine the occurrence of *Campylobacter jejuni* in chickens and environment as well as to determine the antibiotic resistance rate amongst *C. jejuni* isolates from chickens and environment at Orang Asli villages in Perak. Three Orang Asli villages in Perak were visited. We collected 42 cloacal swabs from chickens. For the environment, samples were collected from water (40), flies (40) and soil (40). Two (5%) flies and 16 (38.1%) chickens were found positive for *C. jejuni*. The disk diffusion method was employed to determine the susceptibility of *C. jejuni* isolates to 10 antibiotics. The isolates from chickens showed resistant to nalidixic acid (50.0%), cefpodoxime and enrofloxacin (28.8% each), tetracycline (21.4%), streptomycin, ampicillin-sulfbactam and ciprofloxacin (14.3% each), erythromycin and sulfamethoxazole-trimethoprim (7.1% each). The two isolates from flies were resistant to nalidixic acid (100%) and 50% of these were resistant to tetracycline, ampicillin-sulfbactam, ciprofloxacin, sulfamethoxazole-trimethoprim, enrofloxacin and cefpodoxime. The chickens and flies may play a role in the spread of resistant *C. jejuni* in the villages.

Keywords: *Campylobacter jejuni*, chickens, antibiotic resistance

HAEMATOLOGICAL AND SERUM BIOCHEMICAL PARAMETERS OF ICR-MICE IN SUB-ACUTE TOXICITY STUDY OF Clinacanthus nutans

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Clinacanthus nutans (Burm. F.) Lindau (*C. nutans*) is an important medicinal plant native to Southeast Asia. It is widely used in traditional medicine for the treatment of various illnesses. The effects of repeated daily administration of ethanolic leaf extract of this plant on the blood parameters of ICR-mice are not reported. This study investigated the changes in haematological and biochemical parameters of ICR-mice following a 28-day repeated administration of *C. nutans* ethanolic leaf extract (CELE) in ICR mice. A total of 25, 8-week old female mice were equally divided into 5 groups; groups A (control), B (125 mg/kg), C (250 mg/kg), D (500 mg/kg) and E (1000 mg/kg). The extract was administered daily for 28 days via oral gavage, the mice were monitored daily for any signs of toxicity and sacrificed humanely on 29th day of the experiment. Blood samples were collected for haematology and serum biochemical analyses. The results did not show significant ($p>0.05$) alterations in the body weight, relative organ weights and haematological parameters between groups throughout the experiment. However, there was a significant ($p<0.05$) increase in creatinine level of mice in group E (50.20±8.33 µmol/L) compared to control (18.80±1.62 µmol/L). It is concluded that the repeated oral administration of CELE induced renal injury at 1000 mg/kg in female ICR mice.

Keywords: *Clinacanthus nutans*, toxicity study, oral gavage, ethanolic extract, renal injury

EXPRESSION LEVEL OF VEGF PROTEIN IN THE EPIDERMAL KERATINOCYTES OF EXCISIONAL WOUND TREATED WITH Melastoma malabathricum LEAF EXTRACT IN SPRAGUE DAWLEY RATS

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Melastoma malabathricum has been traditionally used for curing of many ailments including skin problem. This study aims to evaluate the effectiveness of *M. malabathricum* leaf ethanolic extract as an alternative treatment for skin wound via determination of the expression of vascular endothelial growth factor (VEGF) in the epidermal keratinocytes. A total of 120 male Sprague Dawley rats were divided equally into two treatment groups and two control groups. All rats were inflicted with a circular excisional wound (500 mm^2 in size) on the dorsal thoracic region. Rats in the treatment groups were treated topically with low and high (% w/w) concentrations of the herbal extract, respectively, daily for 21 days, while rats in the control groups received silver sulfadiazine (positive control) and no treatment (negative control). Six rats from each group were euthanised at days 4, 8, 12, 16 and 21. The wound in herbal treated groups healed before day 21, and hence only skin samples collected at days 4, 8, 12 and 16 were assessed semi-quantitatively via immunohistochemistry. Low concentration group had significant ($p<0.05$) high mean scores of VEGF in all different days of sampling compared to negative control, and days 4 and 8 compared to positive control. Meanwhile high concentration group only showed significant ($p<0.05$) higher expression of VEGF at days 4 and 8 compared to both negative and positive controls. This study shows low concentration of ethanolic extract of *M. malabathricum* leaf promotes rapid wound healing via upregulating the expression of VEGF in the epidermal keratinocytes.

Melastoma malabathricum LEAF EXTRACT STIMULATES HIGH EXPRESSION OF VEGF IN THE DERMAL LAYER OF SKIN DURING THE PROLIFERATIVE PHASE OF WOUND HEALING IN SPRAGUE DAWLEY RATS

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Vascular endothelial growth factor (VEGF) is a potent inducer of tissue regeneration including skin. This study aims to evaluate the expression of VEGF in the dermal layer of excisional wound treated with *Melastoma malabathricum* leaf ethanolic extract. A total of 120 male Sprague Dawley rats were equally divided into two treatment and two control groups. All rats were inflicted with a circular excisional wound sized of 500 mm^2 on the dorsal thoracic region. Daily topical application of the herbal extract (low and high [%w/w] concentrations), silver sulfadiazine (positive control) and no treatment (negative control) were performed at the wounded area for 21 days. Six rats from each group were euthanised at days 4, 8, 12, 16 and 21. The excisional wound in both herbal treated groups healed less than 21 days compared to negative control, and hence only skin tissues collected at days 4, 8, 12 and 16 were immunohistochemically evaluated. The expressions of VEGF in low concentration group were significantly ($p<0.05$) higher at days 4, 8 and 12 compared to negative control group, and significantly ($p<0.05$) lower at day 16 compared to the other groups. Meanwhile high concentration group only showed significant ($p<0.05$) higher expressions of VEGF at days 4 and 8, and comparable VEGF expressions to negative control at days 12 and 16. In conclusion, low concentration of *M. malabathricum* leaf ethanolic extract induces rapid dermal regeneration as shown by high expression of VEGF in the dermal layer of wounded skin during the proliferation stage of wound healing.

A PILOT STUDY ON MARKET STRUCTURE AND FRESH MEAT PRICES COMPARED TO FROZEN IMPORTED MEAT

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A share of the fresh beef market in Malaysia is estimated to be about 23 percent based on current self-sufficiency level of beef meat. Others are primarily frozen beef which is mainly imported. Fresh beef processing activities are based on local and/or imported live cattle, slaughtered in the abattoirs before the meat are marketed in the fresh markets. Fresh beef is more available in the traditional market compared to the modern retail outlet as it is the main preferred source for Malaysian consumers to buy fresh meat. A good relationship with retailers, quality of meat and halal guaranteed are among the pull factors that influenced a consumer to choose this market. A pilot study was conducted in July 2018 to look at the market structure of fresh beef meat in Malaysia. Several butchers from the traditional market around Putrajaya, Bangi, Kajang and Seri Kembangan were interviewed using a structured questionnaire form. Types of beef cuts, pricing and customer types are some information obtained from this study.

Keywords: fresh beef meat, traditional market, market structure

Rapid Oral Presentation

SERODETECTION OF LEPTOSPIRAL INFECTION IN STRAY DOGS IN KLANG VALLEY

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Leptospirosis is an endemic zoonoses affecting dogs and other warm-blooded animals. Stray dogs have been postulated to play a potential role in disease transmission. The roaming behaviour amongst the stray dogs may increases the risk of infection through reservoir animal contact. Besides that, these infected dogs may assist disease dispersal amongst stray dogs or to human through close contact. In this study, the serodetection of *Leptospira sp*. infection in stray dogs was determined. Blood was collected from 47 stray dogs from two dog pounds in the Klang Valley. All blood samples were centrifuged, and serum samples were tested for *Leptospira sp*. infection using microscopic agglutination test (MAT) against 15 leptospiral serovars with a seropositive cut-off titre of ≥ 1:100. Nine dogs were found to be positive to *Leptospira sp.* infection. Antibodies against serovar *Bataviae* had been detected in six dogs with titres 1:100 (n=4/6), 1:200 (n=1/6) and, 1:400 (n=1/6). Three dogs were positive for serovar *Icterohaemorrhagiae* (1:100), *Canicola* (1:400), and *Copenhageni* (1:100), respectively. This preliminary detection of vaccinal serovars (*Icterohaemorrhagiae and Canicola*) may suggest post-vaccination antibodies. Alarmingly, the non-vaccinal serovars (*Bataviae* and *Copenhageni*) were predominantly detected and indicated a possibility of infection (current or past). However, infection status was not determined. Bacterial isolation and molecular detection of urine samples was needed to further confirm the possibility of infected stray dogs disseminating *Leptospira sp.* via urine shedding. The urine of infected dogs may contaminate the environment and become a public health threat with risk of potential outbreaks.

EFFICACY OF GLYPHOSATE, AMETRYN, METSULFURON METHYL FOR CONTROLLING ELEUCINE INDICA (L.) - A REVIEW

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Weeds can replace desirable grass species, filling in gaps or voids and reducing yield and overall quality of pasture and forages. Any plant competing with cultivated plants or that in some way interfere with man's legitimate activities is considered to be a weed. Without question, weeds can compete directly with forage grasses or pasture to reduce their nutritional value and longevity. *Eleusine indica* (L.) Gaertn, commonly known as goosegrass is one of the world's worst weeds (Holm et al., 1977). It is a very competitive and cosmopolitan species. In tropical countries such as Malaysia, *E. indica* infestation occurs mostly in crop area, fruits and vegetable orchard and nurseries (A Jalaludin, 2014). There are many methods of weed control like hand weeding, cultural method, chemical method and integrated weed management. Chemical method or herbicides is not only cheaper but also feasible for timely application. However, it requires more care with reference to appropriate selection of herbicide, its dose and time of application. Glyphosate, Ametryn and metsulfuron methyl are common herbicides used for controlling the infestation of goosegrass (*Eleusine indica* (L.) Gaertn.) in grazing paddock. However, it has been reported that these herbicides are no longer effective for controlling *E.indica* in the area (Chuah TS et al, 2010). In this connection, the literature on resistance of goosegrass towards these herbicides was collected and summarized.

Keywords: *Eleucine indica*, glyphosate, ametryn, metsulfron methyl

DETERMINATION OF POTENTIAL VECTOR OF WEST NILE VIRUS AMONG Culex Spp. IN WEST COAST MALAYSIA

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West Nile Virus (WNV) is an RNA zoonotic emerging arbovirus which belongs to the Flaviviridae family and maintained in a sylvatic cycle between mosquitoes specifically Culex spp. as vectors and birds as reservoir hosts. Mammals and humans are dead-end hosts which transmitted by infected mosquitoes. Currently, WNV antibodies were discovered among aboriginals and captive birds and positive WNV antigen among wild birds and horse which showing the urgency on WNV study in Malaysia. Culex spp. is a common mosquitoes species in Malaysia. However, WNV study is yet to discover on these mosquitoes. Thus, a cross-sectional study was conducted with an objective to identify the potential vector among Culex spp. populations. Mosquitoes from Kuala Gula Bird Sanctuary, Perak were collected in with CDC Light Trap baited with carbon dioxide and identified taxonomically and pooled into 10. Pre-membrane and E protein gene region were targeted as a primer in the RT-PCR analysis. Minimum infection rate (MIR) rate was calculated followed by sequencing and phylogenetic analysis for the positive result. 300 Culex spp. mosquitoes were identified in the bird habitat and pooled into 30 samples. The samples were comprised of three species of mosquitoes namely 240 Culex(Culex) tritaeniorhynchus (80.0%), 50 Culex(Culex) vishnui (16.7%) and 10 Culex(Culex) pseudovishnui (3.3%). None of the 30 pooled mosquitoes tested was positive WNV. A larger sample size is required for further research. The study provides guidance on the best WNV vector control measures in Malaysia as there is no vaccine or treatment was available on the human in controlling the WNV transmission.

SEROLOGICAL TESTS FOR PARASITIC INFECTIONS IN LIVESTOCK AND PETS CONDUCTED AT THE VETERINARY RESEARCH INSTITUTE, MALAYSIA FROM 2000 TO 2015.

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Parasitic infections such as protozoan and helminth infections abound in livestock in Malaysia. Over a 15 years period from 2000 to 2015, serological tests were conducted in Veterinary Research Institute (VRI) for surveillance and diagnosis to elucidate the presence of common parasitic infections in various animals as part of the general health screening programmes to ensure safe food for the public. A total of 4707 animals consists of cattle, pigs, cats, dogs, and goat serum samples that were tested for Babesiosis, Neosporosis and Toxoplasmosis using the Indirect Fluorescent Antibody test (IFAT), Trichinellosis and Anaplasmosis using Enzyme-Linked Immunosorbent Assay (ELISA) and Trypanosomiasis using Card Agglutination Trypanosomiasis test (CATT). Toxoplasmosis and *Erhlichia canis* infections in dogs and cats were tested using IFAT. Results indicates of *Babesia bovis* (0.6%), *Babesia bigemina* (0.6%), *Neospora caninum* (5.4%) and *Toxoplasma gondii* (0.3%) in cattle using IFAT. *Toxoplasma gondii* was found in goats (35.5%), cats (4.5%), dogs (6%) and there were no positive samples found in pig samples. *Ehrlichia canis* was also found in dogs (5.5%). The ELISA test conducted showed that 2% positive for Trichinellosis in pigs whereas 78% cattle positive for Anaplasmosis. CATT test conducted for Trypanosomiasis in cattle indicated 14.6% positive. In overall, the serological tests using commercial test kits are a useful and quick method of indicating the status of the disease in animals although it is more expensive as when compared to direct examination of thin blood smears, which requires the technical skill for identification and diagnosis.

GROWTH PERFORMANCE OF BROILER CHICKEN (Gallus domesticus) USING PALM KERNEL CAKE BASED CHICKEN FEED

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The study was carried out to assess the growth performance of broiler chicken fed on 30%-45% premium grade palm kernel cake (PKC) feed and the commercial feed. A total of 600 day-old broiler chicks were used to determine the efficiency of utilization PKC animal feed due to the high content of fibrous material. The chicks were randomly divided into four groups fed on commercial starter feed, commercial grower feed, 30% PKC starter animal feed and 45% PKC grower animal feed. The results revealed that the highest average body weight at 35 days was group A (commercial starter and grower feed) are 2005.37±376.20 g compared to group D (30% PKC starter and 45% PKC grower feed) with 1690.89±160.78 g. The best FCR showed in group A and B (30% PKC starter and commercial grower feed) with 1.4±0.16 and 1.4±0.34. In conclusion, the results showed that the inclusion of premium grade PKC at 30%-45% into broiler feed shows promising potential as feed source of energy and protein on broiler chicken.

PHENOTYPIC CHARACTERISTICS TO DIFFERENTIATE BETWEEN FEMALE OF THE RED JUNGLE FOWL, DECOY CHICKEN AND VILLAGE CHICKEN

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Four characteristics were observed to morphologically/phenotypically differentiate between wild caught Female Red Jungle Fowl (FRJF), Female Decoy Chicken (FDC) and Female Village Chicken (FVC). Body weight, body length, wing length, and tarsus length were measured. The mean weight was 1818.0 ± 216.9 gm (FVC), 838.0 ± 25.2 gm (FDC), and 498.0 ± 15.6 gm (FRJF). For body length (cm), FVC also showed the highest at 31.4 ± 0.1cm, FRJF 31.4 ± 0.7 cm and FDC showed the lowest, 29.9 ± 0.7cm. The wing length of FRJF (18.8 ± 0.2cm) and FVC (21.2 ± 0.2) showed significant different ($p < 0.05$), whereas FDC showed average range of 16.0 ± 0.4 cm. FDC showed intermediate mean tarsus length at 7.3 ± 0.1 cm, which the longest tarsus was FVC at 8.1 ±0.1 cm and the shortest was FRJF at 7.2 ± 0.1 cm. In conclusion, several phenotypic characteristics can be observed between FRJF, FDC and FVC groups during field sampling, which constitute the basis for further characterization and development of conservation strategies for red jungle fowl in Malaysia.

PREVALENCE OF BLOOD PARASITES AND INTESTINAL PARASITES IN COMMERCIAL BREEDING PORCUPINES (*HYSTRIX BRACHYURA)* IN PENINSULAR MALAYSIA

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A survey was carried out to determine the prevalence of blood parasites and intestinal parasites from porcupines in captivity in Peninsular Malaysia. A total of 81 blood samples and 25 faecal samples were collected randomly from commercial breeding porcupines. It was found that 40.74% of the porcupines were infected with blood parasites and 100% of the porcupines were infected with intestinal parasites. Blood parasites were detected in the porcupines were *Theileria sp* (25.92%) and *Anaplasma sp* (14.81%). Meanwhile, for intestinal parasites the most prevalence was *Strongyles sp* (64%), followed by *Coccidia* oocyst (56%), *Trichuris sp* (52%) and *Syphacia muris* (4%). The porcupines that were infected were all asymptomatic with low parasite load. Routine monitoring of the presence of parasites in the porcupines is imperative in assisting cage management in the formulation and implementation of preventive and control measures against the spread of infectious parasitic diseases among porcupines within the cages/ captivities or to humans.

Keywords: Blood parasites, intestinal parasites; porcupines; Peninsular Malaysia

COMMON PATHOGEN DIAGNOSED IN PIG SAMPLES RECEIVED BY VETERINARY RESEARCH INSTITUTE FROM YEAR 2014 TO 2017

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A total of 23,322 specimens from 2,592 cases were received in Veterinary Research Institute (VRI) from various states in Malaysia and tested for common bacterial, viral, and parasitic diseases in pig. From 771 samples, the highest rate of isolated bacteria were *Salmonella* (47.38%), followed by *Escherichia coli (15.68%), Staphylococcus (*6.62%), *Streptococcus (*5.57%), *Klebsiella pneumonia (*4.88%*), Pseudomonas (*3.38%), *Acinetobacter (*3.14%), *Aeromonas (*2.79%*),* and *Enterobacter (*2.44%). *Bacillus* and *Pasteurella multocida* were detected at 1.74% respectively. *Enterococcus (*1.39%), *Corynebacterium* (1.05%), *Moraxella* (0.70%) and 0.35% each one of *Aspergillus, Burkholderia,* and *Chromobacterium* were also isolated. The highest percentage of positive samples for viral diseases tested by ELISA were Japanese Encephalitis (JE) (9.15%), followed by Aujezsky's disease (AD) (5.37%), Porcine Circovirus Type 2 (PCV2) (5.09%) and Porcine Reproductive And Respiratory Syndrome (4.52%). While the highest percentage using molecular test for viral diseases were Porcine Circovirus Type 2 (1.62%), followed by Porcine Reproductive And Respiratory Syndrome (PRRS) (1.32%) and Classical Swine Fever (CSF) (0.4%). A total of 1,305 samples were sent for serological testing and were reported positive for *Brucella Suis* (15.32%)*, Brucella Abortus* (0.62%), *Brucella Melitensis* (0.85%), and Melioidosis (0.05%). A total of 99 samples were tested for parasitic diseases, and 10.1% were reported positive with Coccidiosis. Helminthiasis and Sarcocystis were detected at 1.0% respectively. No positive cases were reported for Porcine Parvovirus (PPV), Nipah, Swine Influenza Virus (SIV), Johne's and Leptospirosis within the 4 years period. Continuous assessment is required to establish the comprehensive baseline data of swine diseases in Malaysia.

PREVALENCE OF MRSA IN GOAT AND SHEEP MILK IN TERENGGANU

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The emergence of antimicrobial resistant bacteria has been a concern worldwide. Methicillin Resistant *Staphylococcus aureus* (MRSA) is one of the bacteria that been known to develop resistance toward multiple antibiotics. Recent studies carried at various countries, indicating that MRSA can be found in milk. However, there is still lack of data on the prevalence of MRSA in raw goat and sheep milks in Terengganu. The aim of this study is to investigate the prevalence rate of MRSA in the goat and sheep milks of the selected farms in Terengganu. The data collected will provide data on the current status of MRSA prevalence in Terengganu. A total of 600 udder milks were collect from 300 animals (279 goat and 21 sheep) at 36 selected farms within Terengganu. Then, isolation of *S. aureus* in the milk samples was done using Mannitol salt agar and were determined using biochemical tests and conventional Polymerase Chain Reaction (PCR). The *S. aureus* isolates were also tested using antibiotic discs to determine their antibiotic susceptibility. In this study, 50 milk samples contain *S. aureus* and 2 of the *S. aureus* isolates were MRSA, which suggest the emergence of LA-MRSA. The *S. aureus* isolates show resistances towards various antibiotics (Oxacillin, Cefoxitin, Vancomycin, Penicillin and Amoxicillin). This study provides useful data on the current statues of MRSA prevalence in goat milk, which can be used to prevent transmission of LA-MRSA to human and other animals as well to emphasis responsible use of antibiotic in farm.

FIRST REPORT OF MADURELLA MYCETOMI INDUCED SYSTEMIC PULMONARY AND MYOCARDIUM MYCOSIS IN DUGONG DUGON, MERSING, JOHORE

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Dugongs, is also known as sea cows were registered as the endangered species (IUCN, 2010) and rare in Malaysia. Dugongs can be found in the shallow waters of shoals, reefs, sand flats, and seagrass beds throughout Johor, Sabah and Sarawak. Pulau Sibu and Pulau Tinggi have the highest concentration of Dugong with estimated at 50 heads (DOF, 2016). April 2017, a male *Dugong* carcass estimated age of 10 to 20 years, 1.3m length, and weighing 150kg, was found death in Pulau Tinggi, Mersing Johor. Ante-mortem revealed an old and new scars at the anterior part of the abdomen and the right eye was protruded out and bleeding while the post mortem revealed the upper small intestine and the stomach compartments were semi-impacted with a massive helminth named *Paradujardinia halicoris* worms. Zoonotic fungus named *Madurella mycetomi* were isolated from heart and lung. Histologically, the big mast cells which formed capsules was presence in the bronchiole where the macrophages invade and engulf the spores causing systemic mycoses .The shrinkage of myocardium myocyte and myocardium necrosis with mild vasculitis indicates heart failure. Groucott's stain confirmed *Madurella mycetomi* infection that induced systemic pulmonary and myocardium mycosis in *Dugong dugon.*

Keywords: Dugong dugon; Pulau Tinggi, Mersing ; male; Paradujardinia halicoris; Madurella mycetomi

A STUDY ON UDDER HEALTH MANAGEMENT PRACTICES AND BULK MILK SOMATIC CELL COUNT IN DAIRY CATTLE IN FOSTER FARMS, UNIVERSITI PUTRA MALAYSIA

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Mastitis occurs as a result of the invasion and colonization of infectious pathogen within the udder with somatic cell count (SCC) has been used to assess udder health by which elevation of SCC may indicates intramammary infection (IMI). This study was carried out to determine the udder health management practices with bulk milk somatic cell count (BMSCC) in dairy cattle in Foster Farms, UPM. A total of 6 bulk milk sample were collected from each farm for BMSCC and general management of the farms were also obtained through a questionnaire. The mean BMSCC of the 6 dairy farms was 870,300 cells/ml that range between 503,000 to 1,481,000 cells/ml with five of the farms (83%) milked their cows using portable machine and 4 of the farms (67%) practiced teat preparation prior to cluster attachment. Half of the farms fore-stripped the teats and only one farm (17%) washed the cluster between cows, applied dry cow therapy and practiced post-milking teat disinfection. It is somehow surprising to see that although one farm practiced almost every udder health management activities, the BMSCC was still high (1,087,000 cells/ml) compared to other farms that practiced less activities. This can be explained by other potential factors that may affect the BMSCC (lactation stage, age, etc). Nevertheless, several studies have shown that udder management practices can help in reducing the incidence of IMI and BMSCC thus farm and cow management practices should be improved including the farmers/workers compliance.

FIRST REPORTED CASE OF BRUCELLOSIS IN TIMORENSIS DEER IN MUAR, JOHOR.

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Brucellosis is a major zoonotic disease caused by several Brucella species, which contributes to reproductive loss in animals. Each Brucella species tends to be associated with a specific host species, however animals are highly susceptible to cross species infection when they are kept in close proximity. Sheep and goats are the primary hosts for *B. melitensis*. Infections have also been reported in bovines, camels, alpacas, canine, horses and swine. Brucellosis is usually transmitted between animals in contact with the placenta, fetus, fetal fluids and vaginal discharges from an infected animal. An aborted fetus of *Timorensis* deer was presented for necropsy in September 2017 from a deer farm in Johor. Necropsy revealed bloodstained ascites fluid in the abdominal cavity, an enlarged liver and pale lung. Liver and lung samples were cultured onto Brucella agar following standard procedure. Gram negative coccobacillus colonies were isolated from the lung and liver samples; later identified as *Brucella melitensis*. Conclusively, suggesting the finding to be the first recognized case of *Brucella melitensis* in *Timorensis* deer.

*Key words: Fetus**,** Brucella melitensis, Timorensis, Muar, Johor.*

INVESTIGATION OF TETRACYCLINE ANTIMICROBIAL ACTIVITIES AGAINST STAPHYLOCOCCUS AUREUS FROM CLINICAL MASTITIS STRAINS IN GROWTH MEDIA AND MILK

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Mastitis is a disease characterized by inflammation of mammary gland which causes economic losses in the dairy industry. Antibiotic therapy has not been successful to control the disease. Interaction of the drug and protein composition in the milk like as casein is believed to reduce drug's efficacy. Therefore, this study was conducted to investigate and compare the antibacterial activities of tetracycline against three *Staphylococcus aureus* strains isolated from clinical mastitis cases in the growth media and pasteurized milk. Minimum inhibitory concentration (MIC) was performed using the broth dilution method. MIC of tetracycline against S. aureus clinical mastitis strain 1 and 3; 2 µg/ml while strain 2; 1 µg/ml. Different concentrations of tetracycline MIC values; 1xMIC, 25xMIC, 50xMIC and 100xMIC from three strains S. aureus were used to determine bactericidal activities by time-kill assay (TKA) in pasteurized milk and growth media at 0, 2, 4, and 24 hour post incubation. The study revealed no bactericidal effect on MIC values of tetracycline against S. aureus strains with the absence of 3-log decrease in CFU/mL of bacteria counts, as compared to the growth control. All three strains of S. aureus showed 100% bacterial growth in pasteurized milk while 75 to 92% of bacterial growth was recorded in growth media at the concentration of 100xMIC of tetracycline. That study confirms the milk inhibits antibacterial activities. Thus, tetracycline intramammary treatment alone may not yield the best effect in treating clinical mastitis.

Keywords: S. aureus clinical mastitis, tetracycline, minimum inhibitory concentration (MIC)

PRELIMINARY STUDIES ON THE CONTENTS OF MAJOR MINERALS IN VARIOUS FEEDSTUFF

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Major minerals especially magnesium, phosphorus and calcium play an important role in the development and growth of ruminants and poultry. While most feedstuffs naturally contain these major minerals at specific levels, many types of feed formulation approach are also being developed to optimize the absorption of certain minerals for profitable animal production. This study was conducted to determine and classify the contents of major minerals found in feedstuff received from various commercial and private feed mills as well as farmers at Veterinary Public Health Laboratory (VPHL). Various feed samples received were analysed using ICP-MS to determine the composition of each type of feed. The feedstuffs were classified into four categories of ruminant, poultry, grass or forages and others. Ruminant feedstuff showed a high amount of potassium (6000-17000 mg/kg) and calcium (3500-9000 mg/kg) with phosphorus and magnesium ranging from 2000-5500 mg/kg and 1900-2500 mg/kg respectively. This result is similar to poultry and others feedstuff. For grass or forages, calcium, potassium, phosphorus and magnesium ranges from 2000-6000 mg/kg, 5500-10000 mg/kg, 900-2000 mg/kg and 3000-4500 mg/kg respectively. The results showed variations in the amount of mineral content in the different type of animal feedstuff which can be useful in feed formulation. The information obtained in this study can be used in optimizing the correct contents of minerals and reduce production cost if possible in order to formulate an effective feedstuff that can highly benefit animal production.

Keywords : Minerals, feedstuff, feed formulation, animal production

PROTECTIVE EFFICACY OF RECOMBINANT NEWCASTLE DISEASE SUBUNIT VACCINE AGAINST CHALLENGE WITH MALAYSIAN GENOTYPE VII NEWCASTLE DISEASE VIRUS.

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Recombinant baculoviruses containing the hemagglutinin-neuraminidase (rHN) glycoprotein coding region of Malaysian Genotype VII (gVII) Newcastle disease virus (NDV) was constructed in an attempt to develop an effective subunit vaccine against Malaysian gVII NDV. Protective effect of the subunit vaccine was determined by accessing haemagglutination inhibition (HI) antibody titer, clinical signs, mortality and virus shedding after challenge with Malaysian gVII NDV 12234/2010 strain (MAY-gVII-NDV-12234/10). SPF chickens were divided into five groups, and each group was vaccinated once subcutaneously with the Seppic-adjuvanted antigen of different rHN concentrations (10^4 cell/ dose, 10^5 cell/dose, 10^6 cell/dose, 10^7 cell/dose and uninfected cell). The immunized chickens were then challenged with 2x 10^5 EID_{50} per 0.1ml of gVII NDV (MAY-gVII-NDV-12234) at 14 days post vaccination (dpv) and closely monitored for mortality and clinical signs. The gVII recombinant ND HN (rNDHN) glycoproteins expressed in *Sf*21 cells exhibited good protection against clinical signs and mortality, showing a significant difference ($p<0.05$) in HI antibody titer of the group receiving 10^7 cell/dose in comparison to groups receiving 10^4, 10^5 and 10^6 per dose at 14 dpv with mean HI titers (Log_2 ± SD) 4.1 ± 0.7 , < 1, 1.1 ± 0.7 and 3.3 ± 0.7 respectively. The vaccine provides 100% (15/15) protection against clinical signs and mortality in both groups with 10^7 cell/dose and 10^6 cell/dose and suppresses virus shedding by 60%. The findings suggest that the rNDHN glycoprotein derived from local gVII NDV can be a subunit vaccine candidate for chickens in a future ND eradication and control programme.

DETERMINATION OF MULTI-CLASS VETERINARY DRUGS IN CHICKEN FEED BY ULTRA PERFORMANCE LIQUID CHROMATOGRAPHY TANDEM MASS SPECTROMETRY

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The use of veterinary drugs including antibiotics has received global attention in recent years especially due to the development of antimicrobial drug resistance. It is essential that suitable methods of analysis are available to control this problem. A multi-class method for the determination of 31 veterinary drugs belonging to 10 different classes in chicken feed has been developed. The method was based on QuEChERS (quick, easy, cheap, effective, rugged, and safe) extraction. The sample preparation included ultrasonicated with the mixture of acetonitrile, methanol and McIlvaine buffer followed by phase separation with $MgSO_4$:NaCl addition. The detection and quantification were performed using single analytical run by ultra-performance liquid chromatography coupled with electrospray ionization and tandem mass spectrometry (UPLC–ESI–MS/MS) operating in both positive and negative multiple reaction monitoring (MRM). The chromatographic separation was performed on a C_{18} column using methanol and 0.2 mM ammonium acetate in water (pH5) as the mobile phase. Validation was performed in accordance with the international guidelines. Acceptable results regarding linearity of the method, limit of detection (LOD) and limit of quantification (LOQ) were achieved for 23 of 31 investigated substances. The LOD and LOQ of all drugs were 0.05 – 1.12mg/kg and 0.17 – 3.74mg/kg, respectively. Average analyte recoveries ranged from 66.7 to 119.1%, and the repeatability was in the range of 0.74 to 20.74%. The validation results demonstrate that the described LC-MS/MS method provides sensitive, repeatable and reliable for safety monitoring and controlling veterinary drug use in chicken feed.

SERODETECTION OF LEPTOSPIROSIS IN STRAY CATS IN MALAYSIA

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Leptospirosis is among the most common zoonoses infection worldwide, and it is an endemic disease in tropical countries. Cats can become infected with *Leptospira* but they seldom show clinical signs. In comparison to the healthy cats, cats with kidney disease showed higher seropositivity for leptospirosis. In Malaysia, leptospirosis in cats is under-investigated. The aim of this study was to serologically detect antibodies against *Leptospira* sp. in stray cats in Malaysia. Forty-eight blood samples were collected from cats nearby Klang-Valley. During the physical examination, most of the cats showed mild upper respiratory disease. None of the cats showed evidence of jaundice. The sera were tested against 20 pathogenic leptospiral serovars by using microscopic agglutination test (MAT) based on a cut-off titre of ≥ 1:100. Ten cats (22.9%) were found to be seropositive to at least, antibodies against serovar Bataviae were detected in nine cats with titres ranging 1:100-800. Two cats were positive to Javanica with titres reached to 1:1600. This preliminary results indicate that leptospirosis in cats is not uncommon in Malaysia. The recorded titres indicate possible current infection (1:800-1:1600) or previous exposure with titres lower than 1:800. Further study of the *Leptospira* infection in cats is of crucial importance in order to investigate their role in the transmission of the disease.

RETROSPECTIVE STUDY OF EQUINE COLIC CASES REPORTED TO UNIVERSITY VETERINARY HOSPITAL (UVH) FROM YEAR 2015 TO 2017

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Colic is a broad term use to describe a variety of condition that causes the horse to show clinical signs of abdominal pain. It is one of the most common emergencies and one of the leading causes of death in equine practice.In this study, a retrospective study of equine cases reported to University Veterinary Hospital (UVH) from year 2015 to 2017 was carried out to determine the frequency of equine colic cases, the case fatality rates of equine colic diagnosed in UVH and finally to determine the association of age, sex and breed with the type of colic diagnosed. Data of equine cases attended by UVH veterinarians were extracted and analyzed. Out of 1,152 equine cases reported to UVH from year 2015 to 2017, 131 cases were diagnosed with colic. The equine colic case fatality rate is 11%. There is no significant association between age, sex and breed with type of colic diagnosed in UVH

EVALUATION OF DIAGNOSTIC SENSITIVITY AND SPECIFICITY OF MELIOIDOSIS COMPLEMENT FIXATION TEST IN SHEEP AND GOAT USING 2124/01 BURKHOLDERIA PSEUDOMALLEI ANTIGEN

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In Malaysia, Melioidosis in animals has been reported in local goats, sheep, cattle, pigs, deer, monkeys, horses, cats, dogs, and rabbits since 1921. It was also reported among orang utans at the Sepilok Rehabilitation Centre in Sandakan, Sabah in 1965 and 1968, where Burkholderia pseudomallei was successfully isolated. Many reports also suggested a wide distribution of B. pseudomallei in the environment in Malaysia. The serological test that is currently available in Veterinary Research Institute Ipoh is the complement fixation test (CFT) for the detection of antibodies in animals, but the diagnostic sensitivity (DSe) and diagnostic specificity (DSp) of the assay have not been previously established for use in sheep and goats in Malaysia. Therefore, an attempt to produce B. pseudomallei 2124/01 (local isolate) antigen for complement fixation test has been initiated in order to provide the information needed. Analysis of both DSe and DSp were conducted with reference to the 'OIE Manual of Terrestrial Animals Chapter 1.1.1. Principles and Methods of Validation of Diagnostic Assays for Infectious Diseases' at 95% confidence interval and 5% error for estimation of DSe and DSp. As a results, the DSe of the CFT assay using local isolates antigen is 97.8% while the DSp is 100%. In conclusion, the CFT assay using B. pseudomallei 2124/01 antigen is fit to be used as screening and confirmation of antibodies in sheep and goats in Malaysia.

PRELIMINARY STUDY ON VIABILITY OF SMALL-SCALE BIOGAS PLANT DESIGN IN DAIRY FARMS IN SABAH, MALAYSIA

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In 2009, Malaysia introduced National Green Technology Policy with its main agenda was to increase the development of green technology in Malaysia. During the first 2 years after it has been launched, the construction of green technology facilities such as biogas plants and solar panel farm has increased rapidly. In 2011, 10 small-scale low cost biogas digesters were planned to be installed in selected dairy farms around Keningau, Sabah. This project was initiated by Department of Veterinary Services Sabah (DVS Sabah). Two of the biogas plants are concrete, costing RM45,000.00 to RM50,000.00. Whereas the rest are fiberglass digesters that cost around RM4500.00 to RM6000.00. The purpose of this biogas project was for livestock waste treatment, water heater and gas generation. In 2018, it was observed that out of 10 biogas plants, only one biogas plant is still functioning to meet its purposes. This biogas plant is located in Stesen Pengurusan Ternakan (SPT) Sebrang. This farm is currently managed by DVS Sabah as a pilot project and making it as a model farm in biogas for Sabah. The reasons for the rest of biogas plants with these designs not functioning properly are due to poor maintenance, damage, transfer of farm ownership, issues within farm management and lost of interest among the farmers.

THE CHALLENGES FOR DEVELOPMENT OF BIOGAS PLANTS FROM ANIMAL MANURE IN MALAYSIA

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Development of biogas plants from livestock waste in Malaysia is still at its infancy stage compared to biogas plants from other sources of waste. Issues and challenges for its development could be observed from many points of view. To date, there are at least 15 biogas plants based on livestock waste that have been developed throughout Malaysia. With slow phase of technology adaptability, two more biogas plants are planned to be built based on pig manure and dairy cattle manure. Either with proper planning or not, all these biogas plants were originally built for domestic use in which 53.8% for electricity generation whilst 50% as fuel supply. Based on survey conducted, it revealed that only 38.5% of the biogas plants are still functional, mostly located in west coast areas of the Peninsular where intensive livestock farms exist. Another 23.1% and 38.5% of the biogas plants are dormant and never functioning respectively due to poor maintenance, improper planning and design errors, lack of technical knowledge to run the system consistently or insufficient livestock waste to continuously producing the biogas. From the economic aspect, farmers need to spend about RM200-RM15,000 per month to support its maintenance cost. Besides, cooking fuel and electricity supply are affordable and easier to get since Malaysia ranks 8 out of 190 countries in the area of getting electricity supply. This factor seems to give a significant effect on the livestock farmers' willingness to develop the biogas plant in a more systematic way and timely.

HISTOPATHOLOGICAL AND VIRUS TISSUE DISTRIBUTION OF AVIAN REOVIRUS CLUSTER IV IN MALAYSIA

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Avian Reovirus (ARV) has been known to cause a wide range of disease presentations affecting the avian species. This study was performed to compare the microscopic lesions induced by ARVs histologically in six different tissues such as tendon, liver, lung, heart, spleen, and kidney. Tissues samples from 63 weeks old of an infected broiler breeder chickens were collected at four different processing plants in Johor. The tissues were fixed in 10% neutral buffered formalin. After that, the tissues were trimmed, embedded in paraffin, sectioned at 3-5 µm, mounted, stained with hematoxylin and eosin (H&E) and microscopically examined under light microscope. Lesions were scored as no lesions (-), minimal (+/-), mild (+), moderate (++) and severe (+++). Histopathological examination of the tissues revealed different degrees of edema, suppurative infiltration, perivascular cuffing, inflammation, necrosis and many other types of lesions. The tendon tissues were severely damaged when compared to the mildly affected liver, heart, spleen, lung, and kidney. These observed findings support the detection of a pathogenic strain of ARVs Genotype Cluster IV by Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) that was confirmed by DNA sequencing. Hence it also tallies with the farmer's complaint during a field investigation in mid-April 2018. In conclusion, this study verifies that ARV had replicated and spread in all the tissues samples that were taken in varying degrees. The severity of the lesions proves the higher replication of ARV in the tissues.

A COMPARISON OF THE STRAW TECHNIQUE AND CONVENTIONAL TECHNIQUE FOR SAMPLE COLLECTION FOR RABIES FAT

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Rabies is caused by Lyssavirus of the Rhabdovirus family. Rabies was recently reported in 2017 in Sarawak and 2018 in Perlis. The straw technique requires an ordinary drinking straw and skill for the brain sampling. On the other hand, the conventional technique for brain removal requires separation of the head from the spine by cutting through the cervical spine at the atlanto-occipital joint and removal of the whole brain. The straw technique is suitable for transportation of fresh brain sample from an isolated area where samples could be transported in glycerol instead of the whole head on the ice. The conventional technique comes in handy when the distance of the laboratory facility is nearer to the sampling site. Besides that, appropriate equipments, skills, and ability of the operators are dependable in both techniques. The conventional technique more laborious as physical strength is needed. The straw technique is less laborious as it only requires a sharp knife, straw, and skill. The size of the head is important in determining the type of brain removal procedure. The results produced by Fluorescent Antibody Test (FAT) was similar in both techniques. There are many pro and cons when using the straw technique compared to the conventional technique. Therefore, the straw technique is safe and practical to perform as compared to the conventional with some limitation included.

ASCARIDIOSIS COMPLICATED WITH MYCOPLASMA SPP. INFECTION IN VILLAGE CHICKENS

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3 village chickens consist of 2 live birds and 1 dead bird aged 6 months old from the same population were presented Kuantan Regional Veterinary Laboratory on 7 December 2017 for disease investigation by the Kuantan District Veterinary Service Office personnel with the clinical signs of inappetance, pale, difficulty in breathing, cough, torticolis and also weakness. The owner complained that high mortality recorded in a period of 2 months reaching 30% out of 200 birds in a population. The definitive diagnoses were infection bronchitis, mycoplasmosis, coccidiosis and also heavy worm infestation. Blood samples were collected from the live birds for serological test while trachea swabs, cloaca swabs for bacteria and virus isolation prior to post mortem examination. Upon physical examination, 1 chicken showed respiratory symptom which is cough with poor body score (2.5/5). Pale lung, swollen kidney and presence of fluid in the respiratory tract found during post mortem. Samples such as pool organ, trachea and intestine were taken and sent to Bacteriology, Virology and Parasitology Section for further testing. Laboratory result showed positive *Ascaridia galli* eggs through MVK/PARA 03 Floatation method and high burden of *Ascaridia galli* worm from all intestine samples. *Mycoplasma spp*. was isolated from trachea samples and no Infectious Bronchitis disease detected through virus isolation. Based on the post mortem findings and laboratory results, the cause of death of these chickens were malnutrition due to severe ascaridiosis complicated with *Mycoplasma spp*. infection.

Keywords: village chickens, high mortality, *Ascaridia galli*, *Mycoplasma spp*.

EVALUATION OF WHOLE BLOOD TEST KIT FOR SALMONELLA SCREENING FOR POULTRY

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Salmonellosis is an important disease in poultry. Flock screening using rapid salmonella stained antigen is recommended by OIE for rapid diagnosis. A study was conducted to evaluate the performance of Salmonella stained antigen produced by VRI (SAPEN) and the commercial antigen. Twenty minimum disease-free chicken of five weeks old were divided into four group, and three of the group were inoculated with three Salmonella serovar; Salmonella Pullorum, Salmonella Enteritidis and Salmonella Corvallis respectively to induce the hyperimmune sera production. The chicken blood were tested with both antigens, one to two weeks before the immunization. Performance of both antigens were evaluated based on the detection of seropositive chicken and speed of the reaction. Generally, all the immunised chicken were positive for Salmonella using both stained antigen while the non-treatment chicken was negative. Chicken inoculated with S. Enteritidis were 100% tested positive using both antigens throughout the experiment. However, the chicken inoculated with S.Pullorum showed 40% to 80% positive reaction within 14 to 48 days p-i when tested with SAPEN compared to 100% positive of the commercial antigen. This study suggested that both antigens perform equally well for S. Enteritidis antibody detection based on seropositive birds while the commercial antigen performs better than SAPEN in the detection of S. Pullorum and S. Enteritidis antibody based on the reaction time. Thus, it is crucial to the established improved version of local stained antigen for effective diagnosis of the disease in the farm.

REPRODUCTIVE PERFORMANCE OF MAFRIWAL DAIRY CATTLE

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Good reproductive performance of lactating dairy cows is essential for profitable milk production. The objective of the study was to evaluate the effects of three genetic groups of Holstein blood inheritance (M60, M70, and M80) on reproductive traits. Calving to first heat, calving to first insemination, calving to conception, calving intervals and number of inseminations per conception were observed for 72 MAFRIWAL crossbred dairy cows. The data used in this study were extracted from Dairy Champ system in PTH Air Hitam dairy farm, Johor. The result indicated that the length from calving to first heat, and calving to conception was significantly ($p \leq 0.05$) shorter for M70, 43.7 $\pm$ 5.6 days and 117.3 $\pm$ 11.9 days respectively than other groups. Although there were no significant difference ($p > 0.05$), M70 has shown shorter length interval of 74.7$\pm$6.6 days and 379.1$\pm$12.5 days respectively for calving to first insemination and calving interval. No significant difference were observed in all groups for number of inseminations per conception. The results indicated that good reproductive performance are shown in MAFRIWAL crossbred dairy cows that carried 70 percent Holstein blood inheritance compared to other genetic groups. However, further studies are required on other production performance such as milk production and health status to determine which genetic group performed better in overall production performance of crossbred dairy cows in Malaysian environment.

Keywords; Reproductive, MAFRIWAL, Holstein, genetic

CUSTOMER SATISFACTION OF SERVICE QUALITY AT VETERINARY CLINICS IN SELANGOR

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To remain competitive, veterinary clinics should measure customer's satisfaction. The main objective of this study was to identify satisfaction of customers towards the service quality of veterinary clinics. Thirty respondents were surveyed at two veterinary clinics using modified SERQUAL questionnaires. The questionnaire included questions on sociodemographic, overall loyalty, satisfaction and service quality dimensions. Questions on the dimensions were divided into expectation set and perception set scored by using five-point Likert type scale. Gap score for the dimensions was defined as the difference between perceptions and expectation of the same order. Internal consistency was checked using Cronbach's alpha and Pearson correlation coefficient was performed. Data was analyzed using IBM SPSS version 20. Customers were dissatisfied with dimension tangible (-0.11), reliability (-0.08), responsiveness (-0.08), pricing (-0.08), accessible (-0.02) and empathy (-0.01). Customers were satisfied with assurance (0.07) and animal welfare (0.05). The satisfaction for tangible (eg easy access to clinic, modern equipment and comfort) was positively correlated with reliability (0.62) (eg accurate diagnosis). The satisfaction for reliability have a positive correlation with responsiveness (r=0.68) (eg immediate response) and price (eg affordable pricing) (0.646). The satisfaction for responsiveness have a positive correlation with assurance (eg doing the best) (r=0.725). The satisfaction for responsiveness and reliability have a positive correlation (r=0.55) with empathy (eg sympathetic staff). The satisfaction for empathy have a positive correlation with animal welfare (r=0.618) (eg minimize stress to pets). In conclusion, customers were dissatisfied with quality of tangible, responsiveness and reliability of veterinary clinics services.

SPATIAL DISTRIBUTION OF POTENTIAL SWIFTLET FARMING AREAS BASED ON LAND USE STATUS IN JOHOR

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The Edible Bird Nest (EBN) industry have grown vigorously into a multi-million ringgit industry due to its high value in the international market. Increasing demand mainly from Vietnam, Singapore, Hong Kong and China. To date, the Department of Veterinary Services (DVS) all over Malaysia has registered more than 9,600 premises throughout the country. The objective of this study is to give an overview of the possibilities and potential uses of a Geographical Information System (GIS) for monitoring and assisting decision-making process of potential areas for swiftlet birdhouses in the state of Johor, Malaysia. The following areas in which GIS and GIS-functions were incorporated are presented: (1) the distribution of registered swiftlet houses from the year 2014-2017, (2) land use distribution of oil palm, paddy field and urban areas and (3) hot-spot analysis were conducted to determine the area density. 1,779 swiftlet birdhouses was registered in eight districts of Johor and the highest density of birdhouse is located in the district of Johor Bahru followed by Muar and Batu Pahat with a total number of 288, 225 and 220 premises, correspondingly. Furthermore, based on the land use areas in Johor, 80.29% of the total birdhouses was built on oil palm plantation areas whereas 19.71% in urban areas. These findings are essential for better understanding of the potential swiftlet birdhouse management and planning as well as successful EBN production in future.

Keywords: Birdhouses, Geographical Information System, Land Use, Edible Bird Nest (EBN)

NEW APPROACH OF DELIVERING INTRAMAMMARY INFUSION OF STEM CELLS SECRETOMES EMBEDDED HYDROGEL FOR BOVINE MASTITIS

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Mastitis is not a high prevalence disease in Malaysia but the highest contribution of diseases in any dairy farm. Worldwide, mastitis is one of the most widespread and expensive diseases affecting the dairy business. It is the most costly common disease, and the economic loss from the disease itself in US is more than $2 billion a year. The internal teat sealant in the market mostly are made from bismuth salt. There are no other internal teat sealant was found to use other ingredients besides bismuth salt. It is in year 2017, that farmers received complaint from cheese producer, that there is defect in their cheddar cheese known as Black Spot Defect. Until now, no other polymer were use as internal sealant, thus this research is the first to develop an intramammary internal sealant using bacterial cellulose. The focus of this research is to develop a new delivery method of stem cells secretome loaded hydrogel via intramammary injection. The delivery of secretome is to help regenerate epithelial cells lining in the teat canal and act as antibacterial.

COMPARISON OF FATTY ACID PROFILE FOR CHICKEN MEAT PRODUCED FROM THE USE OF PALM KERNEL CAKE (PKC) FEED AND COMMERCIAL CHICKEN FEED.

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This study aims to compare the fatty acid profile in chicken meat from the use of premium grade palm kernel cake (PKC) feed compared to the commercial feed. A decrease in saturated fatty acid (SFA) level and a concomitant increase in the monounsaturated (MUFA) and polyunsaturated fatty acids (PUFA) content of meat may confer benefits to human health. A total of 80 samples from two groups feeding type were tested. Group A used commercial chicken feed while Group B used PKC feed. Score plot of PCA (principle component analysis) showed possible groupings between Group A and Group B, indicating that the fatty acids profile from the two respective groups were somehow different. PCA loading plot showed that the differences might come from capric acid (C10:0), lauric acid (C12:0), myristic acid (C14:0). palmitic acid (C16:0) and palmitoleic acid (C16:1). In conclusion, PKC feed may give different fatty acid profile in chicken meat compared to conventional commercial feed. Thus, it may produced meat that can be healthier or wise versa to the consumers. Further study need to be done to look in depth types of fatty acids gives significant effect to consumers health.

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