

**SUPPLEMENT TO
THE SRI LANKA
VETERINARY JOURNAL**



**64th Annual Convention of the
Sri Lanka Veterinary Association**

**Programme of the Annual Convention 2012
&
Abstracts of Scientific Papers Presented at the
Annual Scientific Sessions 2012**



THE SRI LANKA VETERINARY JOURNAL

64th Annual Convention of the Sri Lanka Veterinary Association



Programme of the Annual Convention 2012 *and* Abstracts of Scientific Papers Presented at the Annual Scientific Sessions 2012

Vol.59

SUPPLEMENT

2012

The Sri Lanka Veterinary Association

64th Executive Committee (2011 / 2012)

President:

Dr. A. Sivasothy

Asst. Treasurer

Dr. M. A. S. Mallawarachchi

President Elect:

Dr. A. D. N. Chandrasiri

Executive Committee

Dr. K. D. Ariyapala

Dr. K. Kuleshwarakumar

Dr. R. A. J. U. Marapana

Dr. A. M. J. S. Amarakoon

Dr. Ganga Wijesinghe

Dr. Prabath Samaratunga

Vice Presidents:

Dr. D. A. T. Mahagamage

Dr. S. S. P. Silva

Secretary:

Dr. M. Ijaz

Ex-officio Members:

Dr. Ashoka Dangolla

Prof. H.B.S. Ariyaratne

Asst. Secretaries:

Dr. Ushan Pallegama

Dr. L.G.S. Lokugalappatti

Editor SLVJ:

Prof. R. Shivakaneshan

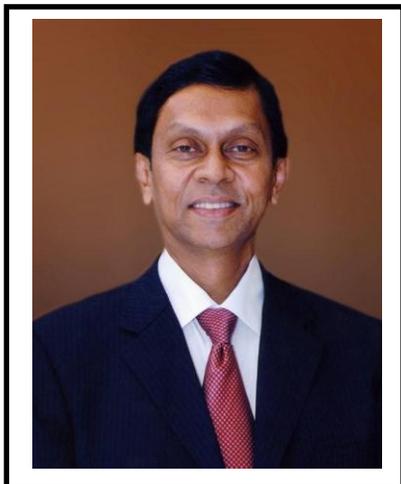
Treasurer:

Dr. Sumudu Kariyawasam

This Supplement was edited by

Dr. S.S.P. Silva & Dr. L.G.S. Lokugalappatti

Message from Mr. Ajith Nivard Cabraal
Governor, Central Bank of Sri Lanka



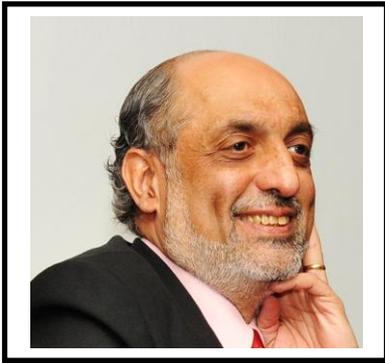
It is with great pleasure that I send this message on the day of the Annual General Meeting of the Sri Lanka Veterinary Association (SLVA).

The importance of the veterinary profession in several areas of community and economic development is widely recognized and the focus of your deliberations on Veterinary Public Health is indeed timely. I understand that the Veterinary Public Health concerns all areas of public health including environmental issues, animal welfare and food production. Sri Lanka during the past few years has entered an era of rapid economic and social progress improving food supply and food security in the country. The veterinarians have a significant opportunity to provide the much needed leadership to develop modern standards of animal welfare and facilitate the development of more efficient surveillance and intervention strategies relating to pet animals, farm/production and technology transfer required to improve food production efficiency.

I wish the SLVA all the best in their Annual General Meeting deliberations and hope that you will be able to contribute more fully to the improvement of public health and animal welfare and economic, and social development in Sri Lanka.

Ajith Nivard Cabraal
Governor, Central Bank of Sri Lanka

Message from the WHO Country Representative



In the past two decades, emerging and re-emerging zoonotic diseases have acquired global significance for Veterinary Public Health. These include leptospirosis and rabies in several countries including Sri Lanka. Viral haemorrhagic fevers such as Marburg and Ebola in Africa, and Hanta viruses and West Nile virus in the Americas are further examples of zoonotic agents causing human illness and death.

Further, the threat of global influenza pandemic has resulted in renewed actions and relation to mammalian and avian reservoirs. These developments call for increased levels of epidemiological surveillance and preparedness, and for novel approaches to control and prevention. All these require rapid responses from, and teamwork between, physicians and veterinarians.

Veterinary Public Health emphasizes preventive, economic and population aspects of animal health and production, as they relate to human health and well-being. In this context, it is timely to organize this annual event with a theme of “Role of Veterinary Public Health in Economic Development”.

I extend to the Council and members of the Sri Lanka Veterinary Association my sincere good wishes at this occasion.

Dr Firdosi Rustom Mehta

WHO Country Representative to Sri Lanka

President's Message



It is my great privilege to write this message to 64th Annual General Meeting of Sri Lanka Veterinary Association. I am thankful for the membership and the previous executive committee for having had confidence on me and elect me as president to lead this prestigious professional organisation for a period of one year.

Sri Lanka Veterinary Association was founded in 1940 with Dr. W. A. D. Silva, then Hon. Minister of Health in the chair, with the participation of the first Prime Minister of Ceylon Honorable D. S. Senanayake as the Minister of Agriculture, with few other professional colleagues around them. Today, the membership of our Association is well over thousand in numbers.

At the beginning of our tenure, we declared this year as the year committed for veterinary public health and working towards one health concept. Therefore our theme was veterinary public health in economic development and hence at the 64th Annual Scientific Sessions held on 11th May 2012 at the Plant Genetic Resource Centre, Gannoruwa, Peradeniya, theme seminar was dedicated for this. Prof. S. B. Sunil-Chandra gave a very important and valuable presentation about veterinary public health and emerging viral diseases concerned in one health concept.

During the tenure, the executive committee was successful in organizing various programme to fulfill corporate social responsibility (CSR) and membership knowledge sharing as professional enhancement (CPD) which is the main objective of our Association. After a lapse of several years, the EXCO was able to renovate the office at OPA centre.

With the assistance of Commonwealth Veterinary Association, SLVA had two transfer of technology programme to tally the women empowerment concept of CVA in Horana and Nikkeweratiya with the support of member veterinarians under CSR. Also, SLVA had school children awareness programme about rabies elimination at Kaduwela and anti-rabies campaign at Kundasale under CSR. The EXCO was able to organize CPD programme for veterinarians of Western, Northern, Uva and Sabragamuwa Provinces under various members relevant topics during our period.

While our members serving in state livestock sector and industry are engaged in livestock development programmes towards self-sufficiency in animal products, our concern about the contribution made by the public health veterinarians, wildlife and zoo veterinarians also gained much significance towards economic development in Sri Lanka. I do believe that, future committees of SLVA will consider to look into the needs of our profession and work towards enhancement of the quality of the profession and wellbeing of the animals.

I am extremely thankful for Mr. Ajith Nivard Cabraal, Governor of the Central Bank of Sri Lanka and Dr. Firdosi Rustom Mehta, WHO Country Representative for Sri Lanka for accepting our invitation to grace this occasion of the 64th Annual General Meeting of the Sri Lanka Veterinary Association. At the same time, I extend my heartfelt gratitude to my colleagues in the committee and also to our sponsors for their generous support in making this event a success

Dr. A. Sivasothy
President/SLVA, 2011/2012

The Sri Lanka Veterinary Association

64th Annual Convention

15th June 2012

Hotel Galadari, Colombo

Programme

Business Session (Members only)

- 2.30 p.m. Registration & Tea
- 3.00 p.m. Annual General Meeting
- 5.00 p.m. Trade Exhibition

Induction Ceremony (Members & Invitees)

- 7.00 p.m. Receiving Guests
- 7.10 p.m. Lighting the traditional oil lamp
- 7.15 p.m. National Anthem
- 7.20 p.m. Welcome address by the President
- 7.30 p.m. Address by the Guest of Honor
- 7.40 p.m. Address by the Chief Guest
- 7.50 p.m. Awards to best performed Veterinary Undergraduates
- 8.00 p.m. Awards to best presentations at the 64th Annual
Scientific Sessions
- 8.10 p.m. Induction of new President
- 8.15 p.m. Vision of the new President
- 8.25 p.m. Vote of thanks by the Secretary
- 8.30 p.m. Fellowship & Dinner

Annual Convention 2012

*The Executive Committee of the Sri Lanka Veterinary Association Gratefully
Acknowledge the Following:*

The Chief Guest, Mr. Ajith Nivard Cabraal, Governor, Central bank of Sri Lanka
Guest of Honor, Dr. Firdosi Rustom Mehta, Country Representative of the World
Health Organization

Special Guests for their presence

The staff of the Hotel Galadari, Colombo

Sanduni Offset Printers, Peradeniya – Printers for Printing the Supplement

The members of the Veterinary Profession who helped us in various ways to
make this event a success

All our sponsors and contributors listed below

List of Sponsors and contributors

A. Baur & Co. (Pvt) Ltd	Hayleys Agriculture Holdings Ltd
Agrinova Pvt Ltd	Hemas Pharmaceuticals (Pte) Ltd
Agro Nutrition (Pvt) Ltd	Lonach Dairy Farm
Alltech Biotechnology (Pvt) Ltd	Lohmann Animal Health
Analytical Instruments (Pvt) Ltd	Maxies & Company (Pvt) Ltd
Astron Animal Health	Mega Vet (Pvt) Ltd
Bairaha Farms PLC	Midland Breeders Pvt Ltd
Biovet & Company	Nelna Farm (Pvt) Ltd
Browns & Company PLC	New Anthoney's Farms (Pvt) Ltd
Ceylon Grain Elevators PLC	Provimi Vetlanka (Pvt) Ltd
Chemifarma International (Pvt) Ltd	Pussalla Meat Producers (Pvt) Ltd
CIC Feeds (Pvt) Ltd	QUADRAGEN VetHealth (Pvt) Ltd
CIC Vetcare (Pvt) Ltd	Ravi Breeder Farms Pvt Ltd
Citihealth Imports (Pvt) Ltd	Pedigree
Emerchemie NB Ceylon Ltd	Super Feed (Pvt) Ltd
Farmchemie (Pvt) Ltd	Unical Ceylon (Pvt) Ltd
Farmtech Services Pvt Ltd	Weehena Farm (Pvt) Ltd
Gold Coin Feedmills (Lanka) Ltd	Zagro Singapore Pte Ltd

Organizing committee of the 64th Annual Convention

Dr. A. Sivasothy	Dr. Ushan Pallegama	Dr. K. D. Ariyapala
Dr. M. Ijaz	Dr. L. G. S. Lokugalappatti	Dr. K. Kuleshwarakumar
Dr. A. D. N. Chandrasiri	Dr. M. A. S. Mallawarachchi	Dr. R. A. J. U. Marapana
Dr. Sumudu Kariyawasam	Prof. R. Shivakaneshan	Dr. A. M. J. S Amarakoon
Dr. D. A. T. Mahagamage	Prof. H. B. S Ariyaratne	Dr. Ganga Wijesinghe
Dr. S. S. P. Silva	Dr. Ashoka Dangolla	Dr. Prabath Samaratinga

Sri Lanka Veterinary Association



64th Annual Scientific Sessions

11 May 2012

Programme and Abstracts of Scientific Papers

Edited by

Dr. S.S.P. Silva and Dr. L.G.S. Lokugalappatti

**Plant Genetic Resource Centre (PGRC)
Gannoruwa, Peradeniya**

Sri Lanka Veterinary Association



64th Annual Scientific Sessions

11 May 2012

Programme and Abstracts of Scientific Papers

Edited by

Dr. S.S.P. Silva and Dr. L.G.S. Lokugalappatti

**Plant Genetic Resource Centre (PGRC)
Gannoruwa, Peradeniya**

Sri Lanka Veterinary Association



64th Annual Scientific Sessions

11 May 2012

Programme and Abstracts of Scientific Papers

Edited by

Dr. S.S.P. Silva and Dr. L.G.S. Lokugalappatti

**Plant Genetic Resource Centre (PGRC)
Gannoruwa, Peradeniya**

Sri Lanka Veterinary Association



64th Annual Scientific Sessions

11 May 2012

Programme and Abstracts of Scientific Papers

Edited by

Dr. S.S.P. Silva and Dr. L.G.S. Lokugalappatti

**Plant Genetic Resource Centre (PGRC)
Gannoruwa, Peradeniya**

64th Annual Scientific Sessions 2012

*The Executive Committee of the Sri Lanka Veterinary Association Gratefully
Acknowledges the Contribution of the Following:*

Organizing Committee

Dr. A. Sivasothy	Dr. K.D. Ariyapala
Dr. M. Ijaz	Dr. K. Kuleshwarakumar
Dr. A.D.N. Chandrasiri	Dr. R.A.J.U. Marapana
Dr. Sumudu Kariyawasam	Dr. A.M.J.S.Amarakoon
Dr. D.A.T. Mahagama	Dr. Ganga Wijesinghe
Dr. S.S.P. Silva	Dr.Prabath Samaratunga
Dr. Ushan Pallegama	Dr. M.A.S. Mallawarachchi
Dr. L.G.S. Lokugalappatti	Prof. R. Shivakaneshan
Dr. Ashoka Dangolla	Prof. H.B. S. Ariyaratne

Scientific Committee

Dr. S. S. P. Silva (Convener)	Dr.L. G. S. Lokugalappatti
Dr. Ashoka Dangolla	Prof. R. Shivakaneshan
Prof. H. B. S. Ariyaratne	

Reviewers of Abstracts

Dr. Ashoka Dangolla	Dr. A. D. N. Chandrasiri
Dr. A. Arulkanthan	Prof. R. P. V. J. Rajapakse
Dr. L. G. S. Lokugalappatti	Dr. S. S. P. Silva
Dr. N. Priyankarage	Dr. Nilmini Jayasena
Prof. H. B. S. Ariyaratne	Dr. Basil Alexander
Prof. S. P. Gunaratne	Dr. Niranjala De Silva
Dr. P. S. Fernando	Dr. B. M. O. A. Perera
Dr. Rasika Jinadasa	Dr. Ganga Wijesinghe

Panel of Judges in Scientific Sessions

Prof. V. K. Gunawardena	Dr. Anil Pushpakumara
Prof. H. B. S. Ariyaratne	Dr. A. Shakthivelu
Dr. A. D. N. Chandrasiri	Dr. Tikri Wijayathilake
Dr. A. Arulkanthan	

Chairpersons of the Scientific Sessions

Dr. B. M. O. A. Perera
Prof. Preeni Abeynayake
Prof. S. P. Gunarathne

Sri Lanka Veterinary Association

Annual Scientific Sessions

11 May 2012

Plant Genetic Resource Centre (PGRC)

Gannoruwa, Peradeniya

PROGRAMME

- 08.30 – 09.30 **Registration / Tea**
- 09.30 – 10.45 **Opening and Theme Seminar**
- 09.30 – 09.45 Lighting of Traditional Oil Lamp
- 09.45 – 09.50 Welcome address: Dr. A. Sivasothy, President, Sri Lanka Veterinary Association
- 09.50 – 09.55 Address by the Chief Guest: Prof. B.S.B. Karunaratna, Director, PGIS, University of Peradeniya, Sri Lanka
- 09.55 – 10.40 Key Note Address: Prof. N. P. Sunil-Chandra, Consultant Professor, Department of Microbiology, Faculty of Medicine & Allied Sciences, Rajarata University of Sri Lanka
- 10.40 – 10.45 Vote of Thanks - Dr. Mohamed Ijaz, Secretary, Sri Lanka Veterinary Association

10.45 – 16.00: **Scientific Sessions**

10.45 – 12.45	Common Session for Selected Papers	
12.45 – 13.45	Lunch - Lobby	
	(Parallel Programme)	
13.45 – 16.00	Clinical / Animal Health Papers - Main Auditorium	Animal Production /Biotechnology / Wildlife - Small Auditorium
16.00 – 16.30	Tea and Poster Session – Lobby	

- 10.45 – 12.45 **Selected Papers - Main Auditorium**
Chairperson: Dr. B. M. A. O. Perera
- 10.45 – 11.00 EXTERNAL STAKEHOLDERS' PERCEPTIONS OF CORPORATE SOCIAL RESPONSIBILITY (CSR) PRACTICES IN SRI LANKAN PHARMACEUTICAL ORGANIZATIONS
Thusitha Abayaratne & David Bamber
- 11.00 – 11.15 THE LIPID PEROXIDATION INDUCED CHANGES IN FROZEN FISH
W.D. D. Fernando, D. M. S. Munasinghe, D. C. A. Gunawardana & S. Weihena
- 11.15– 11.30 PLASMA INSULIN-LIKE PEPTIDE 3 AND TESTOSTERONE CONCENTRATIONS IN MALE DOGS: HORMONAL DYNAMICS RELATED TO AGE AND CRYPTORCHIDISM
Indunil Pathirana, Hiroko Yamasaki, Masahiro Takahashi, Hiromichi Tamada & Noritoshi Kawate
- 11.30– 11.45 INVESTIGATION OF *CAMPYLOBACTER*, *SALMONELLA*, *ESCHERICHIA COLI* AND *STAPHYLOCOCCUS AUREUS* IN CHICKEN MEAT AT SMALL SCALE RETAIL SHOPS IN KANDY CITY LIMITS
D. S. Thilakarathne, K. S. A. Kottawatta, R. S. Kalupahana & P. Abeynayake
- 11.45 – 12.00 PREVALENCE AND MOLECULAR CHARACTERISTICS OF *VIBRIO* SPECIES IN PRE-HARVEST SHRIMP OF THE NORTH WESTERN PROVINCE OF SRI LANKA
G. K. M. Sanjeevani, T. Alter, D. Pichpol, K-H. Zessin & S. Huehn
- 12.00 – 12.15 EFFECT OF EXOGENOUS GONADOTROPHIN RELEASING HORMONE (GNRH) INJECTION AT THE TIME OF ARTIFICIAL INSEMINATION OF SOWS
Kahanda Kanaththage Sarath, P. A. B. D. Alexander, B. M. A. O. Perera & P. G. A. Pushpakumara
- 12.15 – 12.30 IS ANTHELMINTIC RESISTANCE OF BOVINE NEMATODES THE ONLY CAUSE FOR LACK OF RESPONSE TO ANTHELMINTICS?
N. D. Senasinghe, M. B. Navaratne, S. S. Iddamaldeniya, S. K. Abeyratne & K. D. M. N. Kappagoda
- 12.30 – 12.45 ANTIMICROBIAL RESISTANCE OF FOOD BORNE *SALMONELLA*, ISOLATED FROM A POULTRY PROCESSING PLANT
K. M. S. G. Weerasooriya, P. Abeynayake & R. S. Kalupahana
- 12.45 – 13.45 Lunch - Lobby**

13.45 – 16.00 Clinical / Animal Health Papers - Main Auditorium

Chairperson: Prof. Preeni Abeynayake

- 13.45 – 14.00 CHARACTERIZATION OF VIRULENCE PROPERTIES OF AVIAN PATHOGENIC *E. COLI* (APEC) ISOLATES FROM SRI LANKA
U. K. S. P. Alexander, W. M. P. Bandara, C. Karunaratne,
S. K. Gunathilake, R. P. U. A. Ariyadasa & W. P. S. Sandamalie
- 14.00 – 14.15 SURVEILLANCE OF AVIAN INFLUENZA VIRUS IN DOMESTIC DUCKS IN SRI LANKA
J.M.K.G.K. Jayasundara, A. Sivasothy, H. Kothalawala, C de Silva,
S. Ralapanawa, S.A.E. Aberatne & D.H.S.P. Meththananda
- 14.15 – 14.30 AN OUTBREAK OF ACUTE TYPHLOCOLITIS IN GROUP OF THROUGHbred HORSES IN SINGLE STABLE
Umanga C. Gunasekera, J. L.C. S. Perera, C. Dushyanthan, A. M. P. Abeyasinghe, G. D. R. K. Perera, A. A. A. W. K. Amarasinghe,
P. G. A. Pushpakumara & L. N. A. De Silva
- 14.30 – 14.45 EVALUATION OF THE EFFICACY OF THREE POTENTIAL LARVICIDES THAT CAN BE UTILIZED FOR CONTROLLING MOSQUITOES
N. V. G. R. Nugaduwa, K. D. J. S. Maxim, G. A. Prathapasinghe, A. Arulkanthan, D. A. Satharasinghe, R. P. V. J. Rajapakse & L. J. P. A. P. Jayasooriya
- 14.45 – 15.00 PRESENCE OF *PARAGONIMUS WESTERMANI* IN FREE RANGING LEOPARDS (*PANTHERA PARDUS KOTIYA*) IN SRI LANKA
B. V. P. Perera & R. P. V. J. Rajapakse
- 15.00 – 15.15 ORAL MICROFLORA IN CAPTIVE ELEPHANTS IN SRI LANKA
D. M. A. P. Dissanayake, A. M. R. Bandara, S. S. S. De S. Jagoda & A. Dangolla
- 15.15 – 15.30 DIAGNOSIS, TREATMENT AND MANAGEMENT OF A FELINE PANLEUCOPAENIA EPIDEMIC
W. A. D. C. H. Wickramasinghe & T. L. G. S. Peiris
- 15.30 – 15.45 ISOLATION OF NEWCASTLE DISEASE VIRUS IN THE PELAGIC BIRD, SOOTY TERN (*ONYCHOPRION FUSCATUS*), IN SRI LANKA
Tharaka Prasad, M. G. Thammitiyagodage, R. Karunakaran,
H. Kothalawale, Lilani Karunanayake & Deepal Gajadeera
- 15.45 – 16.00 SURGICAL CORRECTION OF INGUINAL HERNIA AND REMOVAL OF LYMPHOMA IN A BORNEO ORANG UTAN (*PONGO PIGMEUS PIGMEUS*)
L. A. J. P. K. Jayasekara, D. S. Kodikara, B. A. Bandu, S. Mendis & P. Soyza

13.45 – 15.30 Animal Production/Biotechnology/ Wildlife- Small Auditorium

Chairperson: Prof. S. P. Gunarathne

- 13.45 – 14.00 EFFECT OF ESTRUS SYNCHRONIZATION METHOD ON CONCEPTION RATE OF GOATS
A. M. P. Abeysinghe, G. D. R. K. Perera, M. P. K. Sanjeewa,
P. G. A. Pushpakumara, L. N. A. De Silva, D. R. T. G. Ratnayake
& Basil Alexander
- 14.00 – 14.15 EFFECTS OF DIETARY INCLUSION OF RED RAW RICE POLISH AND WHITE RAW RICE POLISH ON GROWTH PERFORMANCE OF BROILER CHICKEN
P. B. A. J. Wickramasooriya, N. Priyankarage, S. P. Gunarathne & S. S. P. Silva
- 14.15 – 14.30 FORMULATION OF DENSE TOTAL MIXED RATION (TMR) BLOCKS FOR RUMINANT FEEDING
W. M. P. B. Weerasinghe, G. G. C. Premalal, N. Priyankarage,
M.W.C.D. Palliyeguru, A. P. D. G. Pathirana & A. K. M. Navarathna
- 14.30 – 14.45 INVESTIGATION OF MOST PROBABLE FACTORS FOR DEVELOPMENT OF CHRONIC MASTITIS IN CENTRAL PROVINCE OF SRI LANKA
D. S. Thilakarathne, W. S. N. Gunawardana, P. Abeynayake & I. S. Abegunawardena
- 14.45 – 15.00 STUDY ON PRODUCTION TRAITS AND LAYER FLOCK MANAGEMENT PRACTICES OF LAYERS DISTRIBUTED BY THE DIVINEGUMA PROGRAMME IN RATHNAPURA DISTRICT – 2011
M. I. G. Jayathilaka & R. P. M. Pathirathna
- 15.00 – 15.15 CAPTIVE BREEDING OF BROWN FISH OWL (*BUBO ZEYLONENSIS ZEYLONENSIS*) IN DEHIWELA ZOO
P. Arunthathy, R. Jayalath & N. K. Pathmasiri
- 15.15 – 15.30 COMPARISON OF BUTTERFLY DIVERSITY IN TWO DIFFERENT HABITATS IN GANNORUWA FOREST
H. K. Umasha S. Hemachandra, N. K. Jayasekara & K. B. Ranawana

16.00 – 16.30 Tea and Poster Session - Lobby

Posters

- 1 QUALITY OF DEEP FROZEN SEMEN USED IN CATTLE ARTIFICIAL INSEMINATION IN CENTRAL PROVINCE, SRI LANKA
G. H. T. A de Silva, W.W. Abeygunawardena, R. M. S. Malkanthi & A. D. N. Chandrasiri
- 2 DETERMINATION OF SERUM CALCIUM (Ca) AND PHOSPHOROUS (P) LEVELS OF DOGS RAISED WITH OR WITHOUT PROVISION OF MINERAL SUPPLEMENTS
A. A. D. T. Chandrasiri, D. A. Satharasinghe, G. A. Prathapasinghe, N. A. Y. Wasantha Kumara & L. J. P. A. P. Jayasooriya
- 3 EFFECTIVE RABIES CONTROL: CULLING vs. VACCINATION
G. S. S. Gunawardana, C. J. Samarasinghe & Y. G. K. De Silva
- 4 OCCURRENCE OF AVIAN HAEMOPARASITIC INFECTIONS IN CASES REPORTED TO PATHOLOGY LABORATORY OF THE VETERINARY RESEARCH INSTITUTE
S. M. T. S. Manchanayake, G. I. S. Perera, H. Kothalawala, W. M. P. Bandara, L. Perera & L. M. P. Wijemanna
- 5 BOVINE TUBERCULOSIS: INVESTIGATION OF CASES WITH HISTORY OF CHRONIC RESPIRATORY DISTRESS
M. D. N. Jayaweera, J. K. H. Ubeyratne, G. I. S. Perera, S. M. T. S. Manchanayake & J. Elvityigala
- 6 EFFECT OF TWO TIER FEEDING WITH FORMULATED CREEP FEED AGAINST SINGLE TIER FEEDING ON WEANING WEIGHTS OF PIGLETS
K. P. L. K. Pathirana, S. S. P. Silva, S. Premaratne & Y. M. Wickramasingha
- 7 FELINE PERINEAL URETHROSTOMY
D. M. Siriwardane
- 8 ONE STEP PCR METHOD FOR RAPID IDENTIFICATION OF *CLOSTRIDIUM CHAUVOEI* FROM INFECTED BOVINE MUSCLE TISSUE SAMPLES
J. K. H. Ubeyratne & M. D. N. Jayaweera
- 9 PREDICTION OF BODY WEIGHT OF JERSEY CATTLE BY USING MORPHOMETRIC MEASUREMENTS
W.M.S.P. Weerasinghe, C.M.B. Dematawewa, G.H.T.A. De Silva, R.M.S. Malkanthi, K. Harendra & A.D.N. Chandrasiri
- 10 CAN ORGANIC TRACE ELEMENTS REPLACE ORGANIC MINERALS IN BROILER DIETS?
C. Senanayaka, S. S. P. Silva & S. Premarathna
- 11 DIAGNOSIS AND CORRECTION OF DISPLACED ABOMASUM IN HIGH PRODUCING DAIRY COWS IN SRI LANKA
A. M. P. Abeyasinghe, J. Jeythiswaren & M. P. K. Sanjeeewa

- 12 OCCURRENCE OF *CLOSTRIDIUM SORDELLII* IN SHEEP AT MEDICAL RESEARCH INSTITUTE
R. Karunakaran, M. G. Thamitiyagodage, R. De. S. Seneviratna,
W. G. S. S. Kumara, T. K. Liyanage & Lilani Karunaratna
- 13 INVESTIGATION ON THE INDIGENOUS CATTLE BREED AND ITS FARMING SYSTEM IN SOUTH EASTERN REGION OF SRI LANKA
M. A. Nadheer & M. N. M. Fouzi
- 14 DOES CAPTURE, NEUTER, VACCINATION AND RELEASE BACK TO THE ORIGINAL ENVIRONMENT CAUSE AN INCREASED AGGRESSION IN FEMALE CROSS BRED DOGS
D. W. D. Subasinghe & K. K. R. Malkanthi

KEY NOTE LECTURE

FUTURE TRENDS IN VETERINARY PUBLIC HEALTH & EMERGING VIRAL DISEASES

N.P. Sunil-Chandra, BVSc (SL), MPhil (SL), PhD (Cambridge)

Consultant Professor, Department of Microbiology, Faculty of Medicine & Allied Sciences, Rajarata University of Sri Lanka, Saliyapura, Anuradhapura, Sri Lanka

What is Veterinary Public Health?

Veterinary Public Health (VPH) is currently defined as *"the sum of all contributions to the physical, mental and social well-being of humans through an understanding and application of veterinary science"* (WHO 1999). This definition is more consistent with the values, goals and targets of the WHO vision 'Health for all in the 21st century'. Human health is strongly linked to animal health and production. This link between human and animal populations, and with the surrounding environment, is particularly close in developing regions where animals provide transportation, draught power, fuel and clothing as well as proteins (meat, eggs and milk). In both developing and industrialized countries, however, this can lead to a serious risk to public health with severe economic consequences.

A number of communicable diseases known as **zoonoses** are transmitted from animals to humans. Veterinary medicine has a long and distinguished history of contributing to the maintenance and promotion of public health. Approximately 90 percent of the worldwide burden of all causes of death and disability occur in developing regions of the world but only 10 percent of all health care funds are spent in these regions (WHO & World Bank). Six communicable disease categories that include pneumonia and influenza, AIDS, diarrhoeal disease, tuberculosis, malaria and measles are responsible for 90 percent of the estimated 13.3 million deaths in children and young adults worldwide due to major infectious and parasitic diseases. Zoonotic agents contribute in several of these categories.

Livestock disease control programmes in developing countries and countries in transition are often established, even though not very critically, on their economic importance. As a result zoonotic control programmes may not be seriously considered, especially if they do not apparently impact animal health and production. Obviously, there is a need to better define the economic impact of zoonoses and other veterinary public health problems with 'burden of disease' analyses, as used by the World Health Organisation (WHO) and the World Bank.

Zoonoses and their impact

In addition, a number of well known and preventable animal diseases that can be transmitted to humans such as rabies, Japanese encephalitis, brucellosis, leishmaniasis and echinococcosis continue to occur in many countries especially in the developing world where they mostly affect the poorest segment of the human population. They cause a serious amount of deaths and millions of affected people every year. Emerging and re-emerging diseases including food-borne illnesses are now a public health concern. According to the WHO, about 75 percent of the new diseases that have affected humans in the past 10 years are caused by pathogens of animal origin. Many of these diseases have the potential to spread through various means over long distances and to become global problems. This has resulted in a

global increased awareness of the close interdependence between animal health and human health.

These include not only new diseases such as Mad Cow Disease, Nipah virus in pigs in Malaysia, SARS in wildlife, HIV and avian influenza but reemerging diseases such as West Nile virus, Japanese encephalitis, and tuberculosis as well as food-borne diseases such as *Streptococcus suis*, Salmonellosis, Campylobacteriosis and *E. coli* O157. Furthermore, other food related issues, such as resistance to antimicrobials, have also become an issue of increasing concern for animal production and human health.

Furthermore, a number of well known and preventable animal diseases that can be transmitted to humans such as rabies continue to occur in many countries especially in the developing world. All major zoonotic diseases responsible for considerable amount of deaths and millions of affected people every year and prevent the efficient production of food of animal origin, particularly of much-needed proteins, and create obstacles to international trade in animals and animal products. They are thus a barrier to overall socioeconomic development too. Common to these emerging problems have been new trends in animal production practices, increased centralised processing of animal products, globalization of the food industry, changing patterns of wildlife populations and their disease vectors and demographic changes in the human population.

Vital areas of veterinary public health

Veterinary Public Health activities have included; zoonoses diagnosis, surveillance, control, prevention and eradication; occupational hazards and diseases associated with live animals and their products; biologics development and production; control of animal populations which may serve as reservoirs or be noxious; prevention and control of food-borne illness of animal origin; ante-mortem and post-mortem meat and poultry inspection; participation in outbreak investigations; environmental activities including vector, water, wildlife and use of animal monitors; biomedical research; emergency actions including natural and man-made disasters; social aspects including natural and man-made disasters and social aspects including service animals and human animal bonding (WHO, 1975; FAO, 1990). Veterinary public health is an essential part of public health and includes various types of cooperation between the disciplines that link the health triad, **people-animals-environment**, and all of its interactions. Therefore, the scope of VPH is clearly multidisciplinary, involving not only veterinarians in both governmental and non-governmental sectors, but also other health professionals and scientists as well as para-professionals who treat, control or prevent diseases of animal origin.

Role of the veterinarian in VPH

Veterinarian in developing countries should be able to deliver fundamentals of public health programmes as close as possible to the individual, small group or community which include basic hygiene principles, quarantine and isolation, biosecurity and inexpensive vaccines, as well as more sophisticated priorities such as surveillance systems, diagnostic capability, treatment options and depopulation capability. The probability of success in any zoonotic disease control programme should be a major consideration. Pre-requisites for success include: effective methods for stopping or reducing agent transmission; high socio-economic importance; epidemiological features that allow good case detection; good surveillance for measuring progress and providing information that can be used to make changes as required.

If VPH programmes focus only on zoonoses, there is the risk that this will be the only contribution that veterinarians can make to improve human health. Zoonoses outbreaks keep

occurring and we keep making the same recommendations. Surveillance and diagnostics do not stop disease - they only identify it. These public health emergencies are failures of prevention. Therefore, Veterinarians need to become involved in all aspects of the agent/host/environment causation triad.

Significance of veterinary input for public health

Veterinarians, due to their ability to link the health of the animal and human populations, are in an ideal position to address the concerns outlined above. They possess the broadest combination of knowledge and skills in the inter-disciplinary ‘farm to fork’ or ‘farm to table’ public health team. Veterinarians, because of their knowledge of animal diseases and food production, as well as their training in ecological, economic and human cultural issues, have become leaders in developing and implementing new methods of promoting sustainable public health which are ecosystemically-grounded, culturally feasible, and economically realistic. In fact the term ‘**herd health**’ is a representation for ‘**community health**’.

Veterinarians in industrialized countries are involved in all aspects of food safety and public health activities, e.g. monitoring of livestock farms and animal marketing, control of slaughter and processing of animal products, importation and quarantine of animals and animal products, overseeing transport and distribution, risk assessment and communication, disease monitoring, (especially zoonotic diseases), vector control programmes, monitoring of wildlife diseases and urban animal control. Veterinary input in major disease control programmes has resulted in the successful eradication of many zoonotic diseases e.g. bovine tuberculosis, brucellosis, rabies, trichinellosis and echinococcosis in many countries. The most moving example has been the control of avian influenza in Hong Kong which has been a direct result of veterinary advice and policy implementation.

Veterinarians, both as policy makers and managers of public health programs, have been employed in government departments and public health agencies worldwide including international agencies such as the World Health Organization (WHO), the Food and Agriculture Organization (FAO) and the World Organization for Animal Health (OIE). The public health and food safety structures in many countries including France and other European countries, Singapore and also Mainland China are directed by veterinarians. i.e. Singapore’s Agri-Food and Veterinary Authority, which has complete responsibility for food safety and agriculture is managed by veterinarians.

Safety of food and water

Despite the fact that some developed countries have reasonably accurate data on the impact of food-borne disease, it is rarely possible at the moment to derive similar statistics for developing countries such as Sri Lanka because of the lack of surveillance systems collecting reliable data. However, with economic development, as the country begins to participate in international trade in food, it is important to develop science-based food safety systems, which will ultimately benefit the local population. The World Veterinary Association has recently adopted the policy that "actions aimed at restructuring of public health services should consider that veterinarians with expertise in veterinary public health and hygiene are able to execute important services in areas of food hygiene and safety".

Codes of good manufacturing practices such as Hazard Analysis Critical Control Point (HACCP) are being introduced widely in developed countries and also for the export sectors in some developing countries. Their primary aim is to reduce the risk of contamination of meat borne pathogens such as Salmonella and *E. coli* O157: H7. The development and implementation of HACCP systems are costly and require skills, training and organization. In

developing countries, greater efforts should be made to educate farmers on codes of "Best Practices" on the farm and in marketing channels for livestock, poultry and fish.

Although zoonotic illness contracted from eating meat derived from animals that have died from Anthrax is recognizable, but increasingly zoonotic agents such as *E. coli* O157: H7 or *Campylobacter* sp. which are not necessarily pathogenic to animals, are not recognized because the "link" to humans is unclear. Currently the actual status of these pathogens in most developing countries is poorly documented. In a recent study of Campylobacteriosis in developing countries showed that the infection was primarily confined to children less than 2 years old, it was often accompanied by other enteric pathogens and was not seasonal. Exposure, poor hygiene and close proximity to animals appear to be risk factors in the very young (Coker *et al.*, 2002).

The safety of meat available for human consumption is put at risk due to the illegal or non-inspected slaughtering of animals in most developing countries including Sri Lanka. The reasons for this are several and include the eating habits of a population - people are used to eating meat only from their own animals and trust no one else to slaughter them. Another reason is that some religious laws in certain communities require for example, that animals be slaughtered according to a prescribed method. If this demand is fulfilled, the common rural citizen is satisfied about the safety of the meat and the lack of any veterinary inspection is less appreciated. Finally, illegally slaughtered meat is usually cheaper than inspected meat. The solutions to these problems are not easy but must include: the enforcement of veterinary law; enforcing the population to purchase inspected and identified meat only from authorized establishments and public health education regarding common infectious agents, drug residues, heavy metals and other environmental pollutants.

Impact of multiple antibiotic resistant bacteria

The use of veterinary pharmaceuticals has become integral to the animal food industry. The worldwide increase in antibiotic resistant bacteria has led to widespread concern that the use of antibiotics in animal husbandry is largely responsible for this trend.

Emerging viral diseases

New diseases which have not been recognised previously are emerging diseases. Known diseases, which are increasing, or threaten to increase, in incidence or in geographic distribution are re-emerging diseases. The diseases of most concern are those that may have international significance – either as a possible global epidemic or pandemic, or because they pose a risk for travellers with high case fatality rates or because they have trade implications.

Emerging viral diseases – the importance of animal reservoirs

Over 75% of all emerging viruses over the past two decades have been zoonotic (transmitted from an animal source); Most of these viruses have come from either bats (particularly fruit bats), rodents or birds – for others, the hosts have yet to be determined (Table 1). Thus the importance of understanding wildlife diseases and the role of wildlife in disease emergence cannot be understated, and there is strong belief that wildlife diseases should be a major component of global surveillance strategies.

Why and how do new diseases emerge?

Many factors can be responsible for, or contribute to, emergence, either singly or in concert. However, the single most important aspect which is common to most instances of disease emergence is the role of human intervention or human activity (Table 2). In addition to those factors listed in Table 2, viral evolution (mutation and recombination), vector biology (spread into new areas and genetics/competence) and host factors (availability and susceptibility) are also responsible for emergence, spread or increased incidence of vector-borne virus diseases.

What are the threats?

New viruses from fruit bats which include Hendra virus (1994 in Australia), Australian bat lyssavirus (1996 in Australia), Menangle virus (1997 in Australia), Nipah virus (1999 in Malaysia), Tioman virus (2000 in Malaysia) and Melaka virus (2007 in Malaysia) appear to be new infectious disease threats. Nipah virus and Hendra virus are two novel viruses which constitute the Henipavirus genus in the family *Paramyxoviridae*. Both viruses are viruses of Pteropid fruit bats. Nipah Virus came to light as the aetiological agent of a highly fatal disease of pigs and humans in Peninsular Malaysia in 1999. The other being Hendra virus, the first to be recognised, was found in Brisbane in 1994 and associated with fatal respiratory infections of race horses and a trainer. During the Nipah outbreak, early cases of encephalitis were reported in Perak, north of Kuala Lumpur, in late 1998, in an area of small farms. The disease was first thought to be Japanese encephalitis (JE), and extensive immunisation was carried out with JE vaccine. However, human cases were observed in vaccinated individuals and pigs were dying, not a normal symptom of JE in pigs. Unfortunately, communication between medical and veterinary authorities was poor. The impact of disease was 105 deaths among 282 cases in Malaysia. Among human fatal cases, there were 82% males and 78% were pig farmers. No new cases occurred after the outbreak, but further deaths were observed in individuals who had recovered but suffered from relapses. Evidence for implicating fruit bats as the wildlife hosts of Nipah virus was confirmed by wildlife serology and virus isolation from Pteropid fruit bats.

Impact of the disease includes, culling of over 1.1 million pigs on 946 farms in the outbreak areas, and during surveillance. The value of 1.1 million pigs was in excess of USD 58.3m. Capital infrastructure on farms and over 36,000 jobs were also lost in this outbreak. The total cost of the outbreak, in both direct and indirect costs, estimated to be in excess of USD 450m.

Transmission was presumed to be initially from bats to pigs, and then from pig-to-pig, and pigs to cats, dogs, horses and humans. There was no human to human transmission. However, subsequently there was good evidence of human-to-human nosocomial transmissions of Nipah virus outbreaks in Bangladesh in 2004, 2005, and 2007, and in India in 2001. Does this indicate future pandemic potential?

How did Hendra and Nipah viruses emerge?

Hendra virus may have emerged because native trees, the source of food for the fruit bats, were cut down - the bats found alternative sources of fruit and nectar from ornamental and commercial fruit trees in urban and semi-rural areas.

Arthropod-borne viral diseases

Emerging Flaviviruses are transmitted by mosquitoes, ticks or sand flies with increasing geographic range and/or incidence. Some examples of emerging arboviruses include; Dengue viruses: spreading throughout tropical and sub-tropical areas, and threatening further parts of

South America, Australia and southern Europe as its vectors become established, Yellow fever virus: into the Rift Valley area of Kenya; concerns about urban transmission in South America and Japanese encephalitis virus: spreading to Pakistan in the west, and Australasia in the south-east; West Nile virus: spreading through the United States, southern Canada, Mexico, the Caribbean, and now emerging in South America. Prominent members of the JE sero-group include Japanese encephalitis virus, Murray Valley encephalitis virus and West Nile virus (incl. subtype Kunjin virus).

Japanese encephalitis virus

JE is a zoonosis, normally circulating between mosquitoes and water birds (particularly ardeids) or pigs. About 45,000 cases reported annually in Asia, but this may be gross under-reporting. Emergence and spread through a combination of changes in land use, and movement by migratory avian hosts. Most JE cases are asymptomatic, with 1:30-1:300 case:infectivity rates; Clinical disease is encephalitis (75-85%), meningitis (5-10%), myelitis (5-10%). Of clinical cases, ~25% fatal, 50% with severe-psychiatric sequelae, and 25% fully resolve. Most cases occur in young children in endemic areas.

It has long been recognised that JE virus has a high propensity to move into and colonise new areas. This has often been due to the development of new rice paddy fields, often associated with land clearing, deforestation, and changed agricultural practices. JEV exists in 4 (or possibly 5) distinct topotypes, or genotypes. Recent studies have strongly suggested that the oldest topotype is topotype 4, found currently only in Indonesia. With the knowledge of the geographic distribution of the 4 topotypes, it now appears that JEV may have originated in south-eastern Asia, and not as previously thought in Japan. JEV and its potential to spread into Australia, Oceania and other continents including the North America and Africa are due to the presence of vertebrate hosts and mosquito vectors to sustain endemic transmission.

West Nile virus (WNV)

This is an example for spread of a virus to a new continent and a new ecosystem. But – is the recent high pathogenicity strain of WNV of regional concern? The Spread of WNV in North, Central and South America occurred during 1999-2006. By 2006, WNV has spread into all States of the US, except Alaska and Hawaii, 7 Provinces of Canada, 11 countries in Central America and the Caribbean, with the first cases in the Caribbean basin in 2001 and 2 countries in South America. There was serological evidence in horses, chickens, or wild birds in Central American and Caribbean countries. Human infections reported from Cayman Islands, Mexico, and Argentina.

West Nile spread to New York in North America. How did it reach New York from Israel or the Middle East? A mosquito carrying the virus traveling on an aircraft, an infected bird blown in, an infected human arrival with a particularly high viraemia? Where will it move next? Is West Nile virus a risk to our Region? There have been only three major European outbreaks and none for the past few years. In the Americas, the virus has begun to spread into Central and South America, but on numbers of veterinary and human cases, appears to be of significantly reduced virulence. Taken together, these tend to suggest that WN virus may not be of major concern.

The intense studies undertaken with West Nile virus in North America have shown that this virus, and presumably other members of the JE serological complex, can be transmitted without the involvement of an arthropod vector. These novel methods of transmission include: Transplantation, Transfusion, Breast feeding, Trans-placental transmission, Occupational exposure (percutaneous and possibly via aerosol) and Urine.

Other arboviruses of concern.....

Chikungunya

Identified in 1952 in Tanzania. An Alphavirus in the family Togaviridae. Range extends from West, East and South Africa, islands in the SW Indian Ocean, and in southern Asia from India to Philippines. Virus (two strains and one serotype) is closely related to the African virus, O'nyong-nyong. Transmitted by *Aedes* sp, especially *Ae. aegypti*, *Ae. albopictus*, *Ae. africanus*. Transmission also reported for some *Mansonia* sp., and *Culex quinquefasciatus*. Little is known about vector competence of mosquito species. Vertebrate hosts include primates, but little is known about other possible vertebrate host species.

Chikungunya is not generally a serious disease, although occasional cases can be severe. Very similar in presentation to dengue fever, with fever, joint pain (or arthralgia), arthritis affecting multiple joints, swelling of joints, nausea, chills and vomiting. There may sometimes be a rash. Haemorrhagic manifestations occur very occasionally (similar to DHF). Death is very uncommon. Up to about 10% have chronic joint symptoms. Chikungunya outbreaks in 2007 have been occurring in India (in at least 14 states), Indonesia, Malaysia, Timor-Leste, **Sri Lanka**, Maldives and Andaman & Nicobar Islands. Many of the Indian isolates have been the same genotype as the SW Indian Ocean. Imported cases have been reported by a number of countries, including Australia, Japan, UK, USA, France, Italy, Spain and Taiwan.

Avian -borne viral diseases

Avian Influenza (Influenza A /bird flu)

Wildlife disease agents normally remain ecologically compartmentalized based on life-history traits of the natural host. Disease outbreaks can occur when compartment barriers break down, bringing natural hosts into contact with new susceptible hosts. The global spread of H5N1 influenza reveals the complex interplay between wild birds, domestic animals, humans, and other wildlife as multiple compartment barriers are breached.

Major viral zoonoses in Sri Lanka

Major viral zoonoses in Sri Lanka include Japanese encephalitis/JE (endemic), Rabies (endemic) and Chikungunya virus (re-emerged). These zoonoses have received public attention as they are capable of causing severe disease in humans. There is evidence of Hantavirus infection in Sri Lanka too. JE virus was first isolated in Sri Lanka in 1986. JE has been involved in several outbreaks in North-Central, North-Western and Western provinces of the country. There were no outbreaks since the introduction of the JE vaccine. Rabies virus (*Rhabdoviridae*) causes a fearful neurological disease which is 100% fatal, and it is still prevailing in many countries including Sri Lanka. In Sri Lanka the nature of sylvatic rabies virus is not known. Rabies is maintained in two not necessarily inter-related cycles - Urban (household, stray and feral dogs, cats) and Sylvatic (Mongoose and Jackal) cycles. JE, Rabies and Hantavirus status in Sri Lanka is discussed further.

Other threats

Beyond outbreaks - Natural disasters such as Tsunami 2004 could occur. But the biggest threat...may be.

An unknown virus suddenly emerging from a wildlife niche, like SARS-CoV, and with the ability to transmit readily by the respiratory route, with a high case fatality rate.....

How should we respond to emerging disease threats?

Veterinary public health expertise is an essential component of the public health response to emerging and re-emerging infectious diseases. Complete integration of Veterinary public health into the full range of communicable disease control activities will result in a broader perspective for responding to emerging and re-emerging infectious disease issues.

This can best be achieved through early and accurate detection of new outbreaks of epidemic diseases including emerging zoonoses, and an improved capacity for understanding the underlying causes for disease emergence, and the ecology of the agents and their hosts will assist in the effective prevention or rapid containment of future emergence events.

Table 1: Examples of Zoonotic Emerging Viruses

Mode of transmission	Virus group	Virus examples
Rodent-borne	Hantaviruses	Hantaan, Sin Nombre
	Arenaviruses	Lassa, Sabia, Machupo, Junin, LCM
Bat-borne: (a) Pteropid	Henipaviruses	Nipah, Hendra
	Rubulaviruses	Menangle, Tioman
	Lyssaviruses	Australian bat lyssavirus
	Filoviruses	Ebola, Marburg
Bat-borne: (b) Insectivorous	Coronaviruses	Coronavirus
	Lyssaviruses	Rabies, Australian bat lyssavirus, etc
Avian-borne	Orthomyxoviruses	Highly pathogenic avian influenza as a possible pandemic strain
	Flaviviruses	Japanese encephalitis sero-group members

Table 2: Factors Responsible for Emergence, Spread or Increased Incidence of Infectious Diseases

Factor	Details of each factor
(a) Human activities	Demographic changes, population growth, urbanization, agricultural/Land use practices, animal husbandry, modern transportation, increased movement of people, animals, and commodities, changing life styles/behavior, self-satisfaction, lack of political will, microbial adaptation, technology and Intent to harm
(b) Natural Occurrences	Climate and Vertebrate host movement

EXTERNAL STAKEHOLDERS' PERCEPTIONS OF CORPORATE SOCIAL RESPONSIBILITY (CSR) PRACTICES IN SRI LANKAN PHARMACEUTICAL ORGANIZATIONS

Thusitha Abayaratne and David Bamber

*Liverpool Hope University Business School
Liverpool Hope University, Taggart Avenue, Liverpool, UK*

This study investigates Sri Lankan stakeholders' perceptions of CSR policies in pharmaceutical organizations using five dimensions of CSR: a) Community and social impacts, b) Environmental issues, c) Extent to which CSR is addressed by organizations d) Organizational obligation to economic CSR and e) CSR Authenticity. Both quantitative and qualitative research techniques were used with 226 participants from various age groups, employment status and gender. The study revealed varied perceptions of CSR policies and practices. Differences in stakeholders' cognitive scheme of were noted. Men and women have statistically different responses to certain Likert type questions: Q5 (Mean men: $Mm=3.15\pm0.855$, Mean females: $Fm=2.89\pm0.893$, $p=0.029$), Q10 ($Mm=1.76\pm1.307$, $Fm=1.43\pm1.068$, $p=0.049$) and Q18 ($Mm=3.08\pm0.700$, $Fm=2.83\pm0.790$, $p=0.012$). The items represent organization obligations to economic CSR, authenticity of CSR and environmental issues respectively. Men perceived those aspects as having positive implications for pharmaceutical organizations while women perceived them less positively. Doctors and Non-Doctors showed significant differences of perception in several questions representing the five CSR dimensions; Q4 (mean Doctors: $MD=4.11\pm1.110$, mean non-Doctors: $ND=3.51\pm1.080$, $p=0.000$), Q7($MD=1.48\pm1.220$, $ND=1.85\pm1.030$, $p=0.020$), Q8 ($MD=2.97\pm0.856$, $ND=2.55\pm0.950$, $p=0.003$), Q13($MD=2.77\pm0.970$, $ND=3.15\pm0.860$, $p=0.005$), Q15($D=3.02\pm0.740$, $ND=3.24\pm0.730$, $p=0.042$) and Q22($MD=2.61\pm1.070$ and $ND=2.18\pm0.970$, $p=0.005$). The quantitative findings were supported by the qualitative findings: comments made by the Sri Lankan respondents addressed the organizations' stand towards the society and concerned ethical practices, authenticity of CSR, along with social and community issues.

There are important implications for pharmaceutical organizations external stakeholders' concerns across gender and employment status are detailed. Doctors as both opinion leaders, and as companies' direct point of contact, expressed the need for a more socially responsible pharmaceutical industry in the region. The comments show the general unease with current company practices. The implications for the government of Sri Lanka are twofold. Firstly, it is of utmost important to educate society about CSR and CSR should be enrolled in educational curricula as an investment for the future. Secondly, government should implement CSR policies through the Ministry of Health and Ministry of livestock Development.

THE LIPID PEROXIDATION INDUCED CHANGES IN FROZEN FISH

W. D. D. Fernando, D.M.S. Munasinghe, D.C.A. Gunawardana and S. Weihena

*Department of Basic Veterinary Sciences, Faculty of Veterinary Medicine and Animal Science,
University of Peradeniya, Sri Lanka*

Fish is a better protein source than meat due to its high biological value. The nutritional value of fish is further enhanced due to higher level of Poly Unsaturated Fatty Acids (PUFA) and minerals. Presence of PUFA and minerals enhances lipid peroxidation resulting in production of cytotoxic and carcinogenic aldehydes. Products of aldehydes and peroxidative react with amino acids to form protein carbonyls and reduces the quality of muscle proteins. Fish constitute 65% of the animal protein intake in Sri Lanka with tilapia being the main freshwater food fish species. Most sale centers store fish at -10°C until sale.

Progression of lipid peroxidation of tilapia stored at -10°C was evaluated for 28 days in three fish at weekly intervals using the content of Thiobarbituric Acid Reactive Substances (TBARS) as an indicator. The effect of peroxidation on muscle protein was evaluated using Salt Soluble Proteins (SSP). The experiment was repeated three times with three replicates for each and data were presented as mean \pm SEM. Data were analysed using a linear mixed-effects model fit by maximum likelihood.

TBARS levels of fish showed a significant increase ($p = 0.003$) during 28 day storage period with 0.41 mg/ Kg per week. The TBAR level did not exceed the permissible limit of 4.5 mg/ Kg in any of the fish, indicating that tilapia can be stored at -10°C for a 21 day period. SSP levels of fish decreased significantly ($p = 0.004$) under the same conditions. A negative correlation ($R^2=0.98$) was observed between TBA and SSP levels in fish.

A significant increase of TBARS during a 28-day period indicates progression of lipid peroxidation even under -10°C . The decrease in SSP levels suggests denaturation of some proteins during storage while the significant negative correlation between TBARS and SSP levels suggest a possible deleterious effect of lipid peroxidation on protein. Further studies have to be carried out to identify specific proteins affected due to peroxidation and specific peroxidative products that affect proteins.

**PLASMA INSULIN-LIKE PEPTIDE 3 AND TESTOSTERONE
CONCENTRATIONS IN MALE DOGS: HORMONAL DYNAMICS
RELATED TO AGE AND CRYPTORCHIDISM**

Indunil Pathirana^{1,2}, Hiroko Yamasaki², Masahiro Takahashi², Hiromichi Tamada²
and Noritoshi Kawate²

¹*Department of Animal Science, Faculty of Agriculture, University of Ruhuna, Kamburupitiya,
Sri Lanka*

²*Department of Advanced Pathobiology, Osaka Prefecture University, Izumisano, Osaka 598-8531,
Japan*

Insulin-like peptide 3 (INSL3) and testosterone are major secretory products of Leydig cells in testis. Along with testosterone, circulating INSL3 has emerged as a novel clinical marker of Leydig cell function in humans. However, reports regarding INSL3 concentrations in peripheral blood are limited to humans and rodents. In this study, age-related plasma INSL3 dynamics in dogs were investigated across a wide age range, and compared with plasma testosterone concentrations. Furthermore, hormone concentrations were compared among cryptorchid, normal and castrated dogs to evaluate endocrine function of Leydig cell component in retained testes.

Canine plasma INSL3 was measured by using a newly developed time-resolved fluorescence immunoassay (TRFIA). The minimum detection limit of the INSL3 assay was 0.02 ng/ml and the detection range was 0.02–20 ng/ml. Blood samples were taken from normal male dogs from pre-pubertal age to advanced age (4 months – 14 years, n=89) and from unilateral cryptorchid (n=31), bilateral cryptorchid (n=7) and castrated dogs (n=3); all were small-breed dogs. Plasma INSL3 concentration increased ($P<0.05$) from pre-pubertal age (4–6 months) to pubertal age (6–12 months), and then declined ($P<0.05$) from pubertal age to post-pubertal age (1–5 years), reaching a constant level. Plasma testosterone concentrations increased ($P<0.0001$) drastically from pre-pubertal age to pubertal age and seemed to plateau thereafter. INSL3 and testosterone concentrations were lower ($P<0.0001$ for each) in bilateral cryptorchid dogs than in normal and unilateral cryptorchid dogs. The INSL3 (range: 0.05–0.43 ng/ml) and testosterone (range: 0.10–0.94 ng/ml) concentrations were readily detected in bilateral cryptorchids, but not in castrated dogs (INSL3<0.02 ng/ml; testosterone<0.04 ng/ml).

The present findings showed a transient surge in plasma INSL3 concentrations at pubertal age in male dogs, but not in testosterone concentrations. Lower plasma INSL3 and testosterone concentrations in bilateral cryptorchid dogs suggest impaired endocrine functions of Leydig cell component in paired retained testes. Peripheral plasma INSL3 and testosterone concentrations have potential diagnosis value in predicting the presence of bilaterally retained testes in male dogs.

INVESTIGATION OF *CAMPYLOBACTER*, *SALMONELLA*, *ESCHERICHIA COLI* AND *STAPHYLOCOCCUS AUREUS* IN CHICKEN MEAT AT SMALL SCALE RETAIL SHOPS IN KANDY CITY LIMITS

D.S. Thilakarathne, K.S.A. Kottawatta, R.S. Kalupahana and P. Abeynayake

Department of Veterinary Public Health and Pharmacology, Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka

Thousands of cases of food-borne illnesses occur each year worldwide, costing for medical care while losing productive time of the nation. True incidence of food-borne diseases in developing countries has been under reported. However, of the estimated food-borne illnesses approximately 30% are due to bacteria. *Campylobacter*, *Salmonella*, *Escherichia coli* and *Staphylococcus aureus* are the major bacterial pathogens that impose a threat to global food safety. Investigation of these pathogens in meat in small scale retail shops are important as it reflects the hygienic quality and the safety of such meat. The objective of the present study was to identify the occurrence of above four pathogens in chicken meat available in small scale retail shops.

Thirty two chicken meat samples were randomly sampled from small scale retail shops around Kandy city limits. Isolation and identification of *Campylobacter*, *Salmonella*, and *Staphylococcus aureus* were performed according to the method described by ISO 10272E, ISO 6579 and SLS 516: part 6: 1992 respectively. For *Escherichia coli* SLS 516: part 3: 1982 was followed with certain modifications.

Escherichia coli was isolated from all the samples and presence of *Staphylococcus aureus* is as high as 90.6% (29/32). Further the study revealed the presence of *Campylobacter* in chicken as 65.6% (21/32) while the presence of *Salmonella* is 40.6% (13/32). Twenty seven samples out of 32 (84.4%) yielded more than three types of above mentioned bacteria.

Although most chicken meat tested from small scale retail shops was highly contaminated with pathogenic bacteria, the incidences of food-borne illnesses are low. This might be due to either underreporting of food-poisoning cases or habit of food preparation in Sri Lanka prior to consumption. Improvement of hygienic conditions of small scale retail shops, prevention of cross contamination and proper processing of meat must be encouraged to prevent food-borne illnesses.

PREVALENCE AND MOLECULAR CHARACTERISTICS OF *VIBRIO* SPECIES IN PRE-HARVEST SHRIMP OF THE NORTH WESTERN PROVINCE OF SRI LANKA

G.K.M. Sanjeevani¹, T. Alter², D Pichpol³, K-H Zessin⁴ and S. Huehn²

¹Government Veterinary Office, Department of Animal Production & Health, Walikanda, Sri Lanka

²Institute of Food Hygiene, Free University Berlin, Germany

³Faculty of Veterinary Medicine, Chiang Mai University, Chiang Mai, Thailand

⁴Postgraduate Studies in International Animal Health, Free University Berlin, Germany

Shrimp culture is a valuable resource of aquaculture sector in Sri Lanka. Human pathogenic *Vibrio* species have become major concern in shrimp production because of their ubiquitous behavior and close association with shrimp in hatcheries and grow out ponds. This study investigates the prevalence and molecular characteristics of *Vibrio* spp. in farmed shrimp of Sri Lanka. A total of 170 shrimp samples from individual ponds of 54 farms were collected one week prior to harvest from North Western province of Sri Lanka during November 2010 to March 2011. Samples were analyzed for *Vibrio* spp. by conventional methods and multiplex polymerase chain reaction (mPCR).

Overall, 98.1% of the farms and 95.1% of the ponds were *Vibrio* spp. positive. Results revealed the predominance of *V. parahaemolyticus* in ponds (91.4%) followed by *V. alginolyticus* (18.8%), *V. cholerae* non-O1/non-O139 (4.1%) and *V. vulnificus* (2.4%). Prevalence of *Vibrio* spp. in farms was also high and again dominated by *V. parahaemolyticus* (98.14%) and followed by *V. alginolyticus* (34.6%), *V. cholerae* (13.5%) and *V. vulnificus* (7.4%). More than one *Vibrio* spp. was detected in 20.5% (35/170) ponds and 48.6% (17/35) were consisted of *V. parahaemolyticus* and *V. alginolyticus*. Multiple *Vibrio* spp. was detected in 20.5% (35/170) ponds. All *V. parahaemolyticus* isolates (n=419) were negative for the virulence associated genes thermo-stable direct haemolysin (*tdh*) and TDH-related haemolysin (*trh*). *V. cholerae* was confirmed by the presence of *ompW* gene and all isolates (n=8) were negative for the cholera toxin (*ctxA*) gene. In addition, *V. cholerae* isolates were serogrouped by mPCR and serum agglutination test. The findings of this study revealed the ubiquitous nature of vibrios and the absence of virulence gene in the environment and shrimp strains of *V. parahaemolyticus* and *V. cholerae*. When compared with other shrimp exporting Asian countries, Sri Lankan shrimp is safe from virulence carrying genes. Although, environmental strains do not possess the potential for causing epidemics, it is important to pay attention on pre and post-harvest handling and adequate cooking. Further studies for the evaluation of toxic genes in vibrios in shrimp are recommendable to ensure the sustainable shrimp production.

EFFECT OF EXOGENOUS GONADOTROPHIN RELEASING HORMONE (GnRH) AT THE TIME OF ARTIFICIAL INSEMINATION OF SOWS

Kahanda Kanaththage Sarath¹, P. A. B. D. Alexander², B. M. A. O. Perera²
and P. G. A. Pushpakumara²

¹*Department of Animal Production & Health, Office of the Provincial Directorate, Western Province, Sri Lanka*

²*Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka*

Number of piglets produced per sow per year plays an important role in pig farming. This can be affected by many factors such as ovulation rate, conception rate in sows, weaning to oestrus interval, number of litters produced per year, litter size at farrowing, number of weaned healthy piglets etc. The objective of the study was to investigate the effect of GnRH injection given at the time of artificial insemination on the conception rate and the litter size of sows. Non pregnant sows (n = 75) with parity 1 to 3 were randomly selected from medium scale swine farms in the Katana Veterinary Division. Landrace, Large White and Duroc breeds were included in the study. All these farms practiced intensive management system with proper record keeping on reproduction of each animal. Animals were separated into two groups as a treatment group and control group.

Treatment Group: Non-pregnant (n = 42) randomly selected sows were fed with commercially available sow feed after farrowing. Piglets were weaned at eight weeks of age. After weaning sows were examined few days for oestrus signs. Artificial Inseminations (AI) were carried out with confirmed oestrus signs. Sows were injected with 50 µg of GnRH (GnRH, Depherelin, Veyx-Pharma, GmbH, Germany) intramuscularly immediately after AI was carried out.

Control Group: Thirty three randomly selected sows (n = 33) were examined for oestrus signs after weaning. When oestrus signs were confirmed AI was carried out as in group 1. This group of sows was not given any hormonal treatment.

Following AI the animals were monitored until farrowing. Data were recorded as conception rates, number of sows got pregnant and number of piglets borne per sow. Data were analyzed using Minitab Statistical Software version 14, 2010. The Means were compared between treatment and control groups using Student's *t* test. The significant level was calculated as $P < 0.05$ level. Conception rate of the GnRH treated group was 34/42 (80 %) significantly higher than that of control group 13/33 (39.36 %) ($P < 0.05$). The mean litter size of the GnRH treated group (11.2 ± 0.6 (range of 4 -18)) was significantly higher ($P < 0.05$) than that of the control group (9.5 ± 0.8 (range of 5-15)). The Conception rate in Landrace, Large white and Duroc sows were 81%, 84 % and 66 % respectively. It was significantly higher ($P < 0.05$) in Land

Race and Large White breeds when compared to Duroc sows. Generally Duroc and Duroc crosses have lower litter size when compare with other breeds. This study concluded that when GnRH was given at the time of insemination, higher conception rates and increased litter size can be achieved in sows compared to control group.

Authors gratefully acknowledge the support of Department of Animal Production & Health and Faculty of Veterinary Medicine & Animal Science, University of Peradeniya.

IS ANTHELMINTIC RESISTANCE OF BOVINE NEMATODES THE ONLY CAUSE FOR LACK OF RESPONSE TO ANTHELMINTICS?

N. D. Senasinghe, M. B. Navaratne, S. S. Iddamaldeniya, S. K. Abeyratne
and K. D. M. N. Kappagoda

*Veterinary Research Institute, Department of Animal Production & Health, PO Box 28, Gannoruwa,
Peradeniya, Sri Lanka*

Failure of dairy cattle to respond to available anthelmintics was complained by several farms, which led the division of parasitology of the veterinary research institute to undertake this study to determine whether anthelmintic resistance is present in cattle in Sri Lanka.

Three trials were conducted in the Wet, Dry and Intermediate zones where deworming had been unsuccessful. Faecal egg count reduction test (FECRT) was performed to detect anthelmintic resistance. Albendazole (n=10) and Levamisole (n=10) was used for the treatment groups while the control group (n=10) was left untreated. E.P.G. (eggs per gram of faeces) was calculated prior to treatment and 14 days post treatment. Pasture contamination was determined by calculating the number of infective larvae per kilogram of dry herbage according to FAO guidelines.

Resistance was considered to be present if the percentage reduction in egg count was less than 95% and the 95% confidence levels among the groups was less than 90. In all three zones Faecal Egg Count Reduction (FECR%) was 100% for Albendazole. In the wet, dry and intermediate zones, FECR% for Levamisole was 100%, 98.7% and 99.5% respectively. In all 3 zones the 95% confidence intervals for both treatment groups was between 92 and 99. Pasture in the intermediate zone was heavily contaminated with 8000.84 nematode larvae per kilogram of dry herbage. In the wet and dry zones, 2000.91 and 1000 nematode larvae were found in a kilogram of dry herbage respectively.

Anthelmintic resistance was not observed for Albendazole and Levamisole in the trials. However, ineffectiveness of anthelmintics could be due the heavy larval contamination of the pasture which could re-infect animals. This possibility should be considered by veterinarians when prescribing anthelmintics and farmers should be advised to keep the pasture contamination minimal by rotational grazing or in-stall feeding

ANTIMICROBIAL RESISTANCE OF FOOD BORNE *SALMONELLA*, ISOLATED FROM A POULTRY PROCESSING PLANT

K. M. S. G. Weerasooriya¹, P. Abeynayake² and R. S. Kalupahana²

¹*Veterinary Research Institute, Department of Animal Production & Health, PO Box 28, Gannoruwa, Peradeniya, Sri Lanka*

²*Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka*

Poultry industry in Sri Lanka has been developed considerably during the past few decades. Consequently, poultry products have become one of the most popular animal protein sources among Sri Lankans. Along with this expansion of the industry, antibiotic usage has progressively increased and lead to emerging antimicrobial resistance level among food borne pathogens. *Salmonella typhimurium* and *Salmonella enteritidis* are the major types of food borne Salmonellae, transmitted via poultry meat products and eggs. With the objective of detecting *Salmonella* contamination in a broiler processing plant and to determine their resistance to various antimicrobials, 720 raw meat samples, 720 caecal samples, 72 water samples from scalding tank and 72 water samples from chill tank were collected from the processing line. Isolation and the identification of Salmonellae were performed according to the ISO 6579:1993 standard methods.

Out of 25 *Salmonella* isolates obtained 19 isolates were identified as *Salmonella typhimurium*. The Kirby- Bauer disk diffusion technique was performed to assess the antimicrobial susceptibility of the isolated *Salmonella typhimurium*, according to the CCLS (2008) standards. All isolates were susceptible to chloramphenicol, enrofloxacin, neomycin, amoxicillin and oxytetracycline. The resistance percentage for erythromycin and streptomycin was 94.7 and 42.1 respectively. Approximately 32% of the isolated *S. typhimurium* was resistant to more than three different types of antimicrobial agents. These results show the occurrence of antimicrobial resistance among Salmonellae associated with poultry and the risk of emerging multidrug resistant food borne *Salmonella*. The antimicrobial resistance of *Salmonella typhimurium* should be addressed by the appropriate usage of antibiotics in poultry for the consumer safety.

CHARACTERIZATION OF VIRULENCE PROPERTIES OF AVIAN PATHOGENIC *E. COLI* (APEC) ISOLATES FROM SRI LANKA

U. K. S. P. Alexander¹, W. M. P. Bandara¹, C. Karunaratne², S. K. Gunathilake¹,
R. P. U. A. Ariyadasa¹ and W. P. S. Sandamalie¹

¹ Veterinary Research Institute, Department of Animal Production and Health, PO Box 28,
Gannoruwa, Peradeniya, Sri Lanka.

² Veterinary Investigating Center, Department of Animal Production and Health, Pannala, Sri Lanka

Escheria coli (*E. coli*) is a major pathogen that causes high chick mortality, reduced weight gain and poor carcass quality resulting significant economic losses to the poultry industry. The objective of this study was to investigate the pathogenic properties of *E. coli* isolates recovered from chicken. A total of eighty five samples were collected from suspected colibacillosis clinical cases presented to the Veterinary Research Institute (n=30), other Veterinary Investigating Centers (n=20), quarantine samples (n=20) submitted to the VRI and dead-in-shell samples (n=15) collected from hatcheries.

Tissue samples were plated on MacConkey agar and incubated at 37°C for 24 h and the resulting colonies were transferred to Eosin Methylene Blue agar and incubated at 37°C for 24 h and stored at 4°C in nutrient broth. Further identification of isolates was carried out according to standard procedures, based on staining and biochemical tests. Haemolysis test (on blood agar), motility test (using SIM medium) and *in vivo* virulence test were performed using one day old chicks. The chicks were assigned into experimental and control groups each consisted of five chicks, injected 10⁶ CFU/bird subcutaneously, monitored for clinical manifestations and mortality rate for every 12 h post inoculation for 7 days. Pathogenicity was graded using standard criteria described below; a) if 60-100% chicks died following inoculation, it was noted as highly virulent isolate (n=51, 60%), b). if 20-40% chicks died, it was considered as a moderate virulent isolate (n=12, 14%) and c) mortality of 20% or less was considered as non pathogenic (n=22, 25.8%). There were 4 haemolytic isolates showing very severe pathogenicity and most isolates were motile.

In conclusion, this study highlights a vast pathogenic variation exists among the avian *E. coli* isolates found in chicken in Sri Lanka. Further studies are needed for sero grouping of these isolates to find the prevalence rate and correlation between serogroups, virulent patterns, origin of the field strains from different husbandry, clinical signs, post mortem lesions and antibiotic sensitivity for these virulent strains.

SURVEILLANCE OF AVIAN INFLUENZA VIRUS IN DOMESTIC DUCKS IN SRI LANKA

J. M. K. G. K. Jayasundara¹, A. Sivasothy², H. Kothalawala¹, C de Silva¹,
S. Ralapanawa¹, S. A. E. Aberatne¹ and D. H. S. P. Meththananda¹

¹*Veterinary Research Institute, Department of Animal Production and Health, P.O box 28,
Gannoruwa, Peradeniya, Sri Lanka*

²*Division of Animal Health, Department of Animal Production and Health, P.O Box 13, Gatambe,
Peradeniya, Sri Lanka*

Avian influenza (AI) is caused by Influenza virus type A, which belongs to the family Orthomyxoviridae. This virus infects many species of terrestrial and aquatic birds including chickens, ducks, geese and swans. Aquatic birds, especially ducks, could play a major role in the epidemiology of AI in chicken because they could act as reservoir hosts. The main objectives of this study were to isolate avian influenza virus and to determine the serological status and sub-types of AI among domestic ducks.

A total number of 68 cloacal swabs were collected from 11 districts and inoculated into virus transport media (pH 7.2-7.4) and transported to the laboratory in ice. Immediately after the arrival to the laboratory, the samples were processed using the standard virology techniques, and 0.1 ml of prepared samples were inoculated into the allantoic sac of 9-11 days old specific disease free embryonated eggs and incubated at 37 °C for 3-5 days for virus isolation. At the end of incubation, the allantoic fluid was subjected to Haemagglutination (HA) and Haemagglutination Inhibition (HI) tests. Further, a total of 353 blood samples were collected from 11 districts and the serum samples were tested using a commercial ELISA kit (Flu DETECT™BE ELISA kit, SYNBIOTICS EUROPE SAS laboratories) to detect antibody against AI.

The HA test was negative for all pooled cloacal swabs tested. Of the 353 serum samples only one (0.28%) was positive for antibodies against AI infection. Sub-typing of the sero-positive sample using H5, H7 and H9 antigens revealed that the sample was negative for the subtypes tested. The data from this study indicate that the AI was not present in the sampled population. However continuous monitoring of ducks is needed to have sound knowledge on the epidemiology of AI among the duck population in Sri Lanka.

AN OUTBREAK OF ACUTE TYPHLOCOLITIS IN GROUP OF THOROUGHbred HORSES IN SINGLE STABLE

Umanga C. Gunasekera¹, J. L. C. S. Perera², C. Dushyanthan¹, A. M. P. Abeysinghe¹, G. D. R. K. Perera¹, A. A. A. W. K. Amarasinghe¹, P. G. A. Pushpakumara¹ and L. N. A. De Silva¹.

¹Department of Farm Animal Production and Health, ²Department of Veterinary Pathobiology, Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka

Typhlocolitis, the inflammation of caecum and colon is common and often a fatal condition in horses, which is caused by sudden changes in feed or ingestion of improper or imbalanced daily ration. These changes alter the microbial flora of large intestine leading to bacterial over growth, especially of enterotoxigenic *Clostridium* species. Diarrhea is the commonest clinical sign of this condition, which could at times be life threatening. Six thoroughbred horses (2 male and 4 female) aged 6 to 12 years, from an upcountry stable were brought between June 2011 to Jan 2012, to the Veterinary Teaching Hospital (VTH) with signs of mild to moderate abdominal colic. On arrival, the animals were pyrexia (36.61 °C to 39 °C), tachycardiac (72/min to 100/min), tachypnoeic (15/min to 60/min) and the mucous membranes were muddy colored. The capillary refilling time was more than 2 seconds. The treatment protocol consisted of vigorous fluid therapy (0.9% Sodium Chloride solution and 5% glucose solution), gastric decompression using a stomach tube, and administration of Flunixinmeoglumine (1.1mg/kg, IV), Penicillin and Streptomycin (20/20LA, 20ml, IM) and in 03 cases ceftriaxone® (50 mg/kg IV, bid). The hematology in all cases revealed haemoconcentration with an increased packed cell volume and elevated serum protein. There was also a neutrophilic leukocytosis with a left shift.

Despite treatments, 4 of 6 animals succumbed soon after arrival and necropsies revealed a frothy secretion in the trachea and bronchi, pulmonary emphysema and diffuse ecchymotic hemorrhages in lungs. There were subepicardial and subendocardial petechiation. The stomach contents were red and watery. There was hepato-splenic congestion, hyperaemia of the small intestines and diffused red, discoloration of the mucosa in the caecum and ascending colon. Histopathology of the intestines revealed diapedesis and denuded epithelial surfaces. Hepatic venous congestion with leukocytes infiltration confirmed moderate hepatitis. Pure colonies of non-hemolytic strains of *E. coli* were isolated from the heart blood in two cases. These clinical and post mortem findings were consistent with acute severe typhlocolitis with consequent endotoxaemia. In this outbreak of typhlocolitis, a diet high in concentrates and low in fiber was thought to have precipitated the condition. As a preventative measure, a dietary change with ad libitum good quality hay/grass with reduced concentrates was recommended.

EVALUATION OF THE EFFICACY OF THREE POTENTIAL LARVICIDES THAT CAN BE UTILIZED FOR CONTROLLING MOSQUITOES

N. V. G. R. Nugaduwa¹, K. D. J. S. Maxim¹, G. A. Prathapasinghe², A. Arulkanthan¹, D. A. Satharasinghe¹, R. P. V. J. Rajapakse¹ and L. J. P. A. P. Jayasooriya¹

¹Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka

²Department of Livestock and Avian Sciences, Wayamba University of Sri Lanka, Makandura, Gonavila, Sri Lanka

Mosquitoes impart a significant negative impact on health and wellbeing of human and animals. Mosquitoes act as vectors that spread a number of diseases. Environmental management and use of insecticides are the major strategies that can be utilized to control mosquitoes that spend first three stages of their life span in the water as eggs, larvae, and then pupae prior to the transformation into full grown adults. Therefore, use of larvicidal agents also can be regarded as an effective and economical method to control mosquitoes.

The current study was performed to determine the efficacy of three different potential larvicides, namely A; novel compound formulated by including a herbal ingredient (pending a patent), B; an organophosphate and C; *Bacillus thuringiensis israelensis* (BTI bacteria). Furthermore, impact of three different larvicidal compounds on the water quality parameters was also evaluated.

Late third or early fourth instars of *Edes albopictus* (150) and *Culex* spp. (210) were utilized for the study. All the studies were performed using standard protocols.

The results from the current study revealed that all three compounds were effective as larvicides though the actions were time and dose dependent. The lowest effective dose of A was 100 ppm. The probit analysis revealed that the LC50 of A is between 76-93ppm at 48hrs after application.

It was evident from the results that the effective doses of B (1ppm) and C (12 ITU/L)) achieved 100% mortality within 24hours, but A (250ppm) showed 100% mortality within 48-72 hours. Interestingly, the compound A was effective against both pupae and larvae, whereas the C was ineffective against the pupae.

Further studies revealed that the basic water quality parameters were not adversely affected by any of the larvicides. Therefore, all these compounds can be effectively used for controlling mosquito vectors and thereby reduce or eliminate the incidence of mosquito-vector borne diseases.

PRESENCE OF *PARAGONIMUS WESTERMANI* IN FREE RANGING LEOPARDS (*PANTHERA PARDUS KOTIYA*) IN SRI LANKA

B. V. P. Perera¹ and R. P. V. J. Rajapakse²

¹Department of Wildlife Conservation, Sri Lanka

²Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka

Paragonimus (lung fluke), the pathogenic agent of human paragonimiasis, is one of the medically important food-borne trematode that occurs in tropical, subtropical, and some temperate countries. Based on the morphological features of adult flukes, such as the branching pattern of ovaries and the arrangement of cuticular spines, four species of *Paragonimus* (*P. westermani*, *P. compactus*, *P. macrorchis*, and *P. siamensis*) have been recorded from Sri Lanka. The freshwater snail *Paludomus* is the first intermediate host while the freshwater crabs or crayfish act as the second intermediate hosts. Humans and other mammals become infected by eating raw or undercooked crayfish or freshwater crabs that harbor the parasites.

In the present investigation, we examined the presence of *Paragonimus* in the lungs of six free ranging leopards (*Panthera pardus kotiya*) in Sri Lanka. The animals were from Nawalapitya (01), Dayagama (01), Ambalangoda (01) and Yala National Park (03) and the causes of death of these animals were the health complications associated with trapping of noose (02), gunshot injuries (01), collision with vehicle (01) and injuries due to inter species fight (02). Three carcasses were examined within the 12 hours of death while the remaining three were frozen for several days before necropsy.

After thorough examination of the lungs, the worms were collected and identified as *Paragonimus westermani*. Origins of the infected animals were from the Nawalapitiya (~3 years) and Yala National Park (~8 months) indicating the parasite has been widely distributed. This is the first report of *Paragonimus* infection among free ranging leopard of Sri Lanka.

ORAL MICROFLORA IN CAPTIVE ELEPHANTS IN SRI LANKA

D. M. A. P. Dissanayake¹, A. M. R. Bandara¹, S. S. S. DE S. Jagoda²
and A. Dangolla¹

¹Department of Veterinary Clinical Sciences, ²Department of Veterinary Pathobiology, Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka

One of the serious obstacle in providing better health care for captive elephants is rapid wearing of the molar (jaw) tooth which consists of fused pre molars and molars. A total of six such jaw tooth pairs erupt approximately every 8th year in their life. If the last jaw tooth can be preserved, their life can be extended in otherwise healthy animals. Some researchers have attempted to fill the broken last molar while others have attempted implantation. The knowledge on oral microbial flora is important in studying tooth decay and such knowledge is scarce in elephants. We have tried to identify the micro-organisms of the oral cavity in captive elephants so oral infections can be treated promptly and properly. Currently, such conditions are treated only with potassium permanganate (Kondis) soaked “bites” given to elephants when they are carrying weights so that Kondis can drain into jaw teeth socket.

Oral swabs, in triplicates, from 15 healthy captive elephants were hygienically collected and were cultured on blood agar in duplicate in order to isolate bacteria. One sample each was incubated overnight (24 hours) at 37⁰C (aerobically) while the other sample from the same animal was incubated in anaerobic jars at 37 ⁰C for 48 hours. The swabs were also cultured on Sabouraud’s dextrose agar and incubated at room temperature in order to isolate fungi.

According to the colony morphology and the biochemical tests, nine species of aerobic bacteria species were isolated and identified. Nonpathogenic *Staphylococcus* species could be isolated from 11 of the samples. Among several anaerobic bacterial species present, only *Clostridium* spp. was identified in 05 samples. *Candida albicans* and *Fusarium* were isolated from 13 and 03 of the samples respectively. Some species of fungi from three of the samples were not conventional and were not identified. This study revealed that the oral cavity of elephant is harboring large numbers of aerobic and anaerobic bacteria, and several species of fungi.

DIAGNOSIS, TREATMENT AND MANAGEMENT OF A FELINE PANLEUCOPAENIA EPIDEMIC

W. A. D. C. H. Wickramasinghe and T. L. G. S. Peiris

Pet Vet Clinic, 421/5, Malalasekera Mawatha, Colombo 07, Sri Lanka

Feline panleucopaenia is a deadly disease especially to young felids. Clinical picture is similar to that of canine parvo viral infection and hence the synonym “Feline Parvo” is also used. This study was carried out using 15 cats presented to PetVet Clinic, Colombo 07, during December 2011 and January 2012. None of them had been vaccinated against panleucopaenia and 12 were below 2 years of age. Out of 15 cases, eight cats showed rectal temperatures above 104°F, while 11 and 08 cats showed vomiting and haematochesia/malaena respectively, and one cat got aborted. All cats showed leucopaenia and thrombocytopenia while five showed mild anemia. Clinical signs, haematological findings and the nature of the outbreak suggested that this could be feline panleucopaenia. However, necropsy, histopathology or virus demonstration using PCR were not done.

Treatment schedule was aimed at preventing secondary bacterial infections (intravenous cefuroxime and metronidazole), correcting dehydration and providing nutrients and electrolytes. Both intravenous and subcutaneous fluids and parenteral and oral nutritional supplements were administered. Ranitidine was used on all cats while metoclopramide was used when necessary. In addition, to correct possible hypokalaemia, oral potassium solution was used. The owners were advised to isolate the affected cats and to vaccinate other cats if they do not show clinical signs within one week - which is the incubation period.

Out of the total 15 cases, only six recovered (60% mortality). Panleucopaenia mostly affects young cats: Interestingly, the unvaccinated cats above 4 years of age in the vicinity did not contract the disease. This epidemic may have been brought about by the non-availability of the vaccine in Sri Lanka for nearly two years. Therefore, vaccination is highly recommended as it saves both lives of cats and financial resources.

ISOLATION OF NEWCASTLE DISEASE VIRUS IN THE PELAGIC BIRD, SOOTY TERN (*ONYCHOPRION FUSCATUS*), IN SRI LANKA

Tharaka Prasad¹, M. G. Thammitiyagodage², R. Karnakaran², H. Kothalawala³,
Lilani Karunanayake² and Deepal Gajadeera⁴

¹Department of Wild Life Conservation, Jayanthipura Road, Battaramulla, Sri Lanka

²Medical Research Institute, Dr. Danister de Silva Mawatha, Colombo 8, Sri Lanka

³Veterinary Research Institute, PO Box 28, Department of Animal Production & Health, Gannoruwa, Sri Lanka

⁴Animal Health Division, Department of Animal Production & Health, PO Box 13, Gatambe, Peradeniya, Sri Lanka

Sudden deaths of birds identified as Sooty terns (*Onychoprion fuscatus*) were observed in Hambantota, Weligama, Ambalangoda, Panadura, Colombo, Chilaw, Putlam and Jaffna peninsula in the coastal belt of Sri Lanka as well as in the inland areas such as Sri Jayawardanapura, Borallasgamuwa, Bandaragama, Kesbewa, Warakapola during the period of May to June in 2011. First incident was reported on 11th May 2011 and increasing incidents could be observed. At the beginning, a total of 42 deaths were reported to the Department of Wildlife Conservation (DWC), Sri Lanka. Of them 34 birds were collected as live birds, but died after 24hrs. Later, DWC received information of about 300-400 dead birds along the coastal area between Hambanthota and Mount Lavinia.

Sooty terns are pelagic species of migratory birds and some dead birds were traced back to Madagascar and Seychelles through the presence of leg-bands and confirmed correspondences. All the affected adult birds showed similar clinical signs. They were conscious but unable to stand on their own. They showed diarrheal signs (vent contaminated with greenish droppings) with normal appetite. Dead birds were emaciated and of them nearly 30 birds had greenish white diarrhea and pasted vent. All the dead birds were subjected to necropsies and samples were obtained for further investigations. Inflammatory lesions were observed in the proventriculus of some birds. Cloacal swabs were collected from live birds with greenish diarrhea for bacteriological isolation of *Salmonella* and *Shigella* species and throat swabs were collected for viral isolation.

Rapid Avian Influenza Test carried out by the Department of Animal Production and Health was negative for Highly Pathogenic Avian Influenza virus strains. Bacteriological investigations at the Medical Research Institute revealed that the samples were negative for pathogenic bacteria. Viral isolation with specific pathogen free embryonated chick inoculation (n=5) and Haemagglutination and Haemagglutination inhibition assays were also performed and the results were positive for Newcastle Disease Virus.

SURGICAL CORRECTION OF INGUINAL HERNIA AND REMOVAL OF LYMPHOMA IN A BORNEO ORANG UTAN (*PONGO PIGMEUS PIGMEUS*)

L. A. J. P. K. Jayasekara¹, D. S. Kodikara², B. A. Bandu², S. Mendis¹ and P. Soyza¹

¹*Department of National Zoological Gardens, Dehiwala, Sri Lanka*

²*New Animal Clinic, Kohuwala, Sri Lanka*

Male Borneo Orang utan at the National Zoological Gardens “Bulu” 37 years old and is 139kg in weight. He showed abnormal gait, reduced appetite and was reluctant to move. Clinical examination from a distance indicated pain in his abdominal area. The laboratory investigations on fecal matter did not show evidence of parasitic infections. Symptomatic treatments for gastro intestinal infection started and in response within three days, the animal defecated and his appetite was slightly improved. In order to perform a complete clinical examination and to arrive at proper diagnosis, it was decided to anaesthetize the animal. The old age, peculiar laryngeal anatomy and heavy weight of the animal, increase the risk of anesthesia. However with precautions, the animal was starved for 8 hours, premedicated with Atropine sulphate 1ml (50mg) intramuscularly given by the blowgun and general anesthesia induced with Ketamin/Xylasine combination. Induction dosage of Xylasine 0.6ml (12mg) and Ketamin 4ml (400mg) administered through intramuscular route. After 15 minutes, second dose of Ketamin 2ml and Diazepam 0.5ml given intravenously. Animal was completely anaesthetized and a blood sample was collected via cephalic vein for hematology and clinical biochemistry. Intravenous 0.9%NaCl drip line was fixed. Animal showed signs of recovery within 10 minutes. Ketamine and Diazepam 1:1 intravenously administered again to maintain the anesthesia. Animal was then subjected to Electrocardiogram, Radiograph of long bones in hands and legs and the abdominal area. Close examination upon shaving the abdominal area, revealed a swelling of lower abdominal area over the scrotum. The ultra sound scanning of the lower abdomen indicated hyperechoic mass descending through the inguinal canal and a solid mass on the abdominal wall between muscle layer and skin. A biopsy was done from the solid swelling. After two hours later “Bulu” safely recovered from anesthesia. The biopsy from the swelling was negative for malignancy and the clinical biochemistry and hematology did not indicate any abnormality. Two weeks later the animal was prepared for surgery using the same pre anaesthetic medications, anesthesia protocol and a surgical correction of inguinal hernia was performed successfully. During the same procedure a mass of 2.5kg was removed surgically from abdominal area. Three hours after the surgery, the animal recovered. Second day after the surgery, he walked and tried to climb on cage indicating good prognosis. Daily dressings of wound and oral antibiotics (Cefalexin 500mg capsules) administered three times daily for 5 days helped curing the animal. He lived for seven more months and died at the age of 37 years.

EFFECT OF ESTRUS SYNCHRONIZATION METHOD ON CONCEPTION RATE OF GOATS

A. M. P. Abeysinghe¹, G. D. R. K. Perera¹, M. P. K. Sanjeewa²,
P. G. A. Pushpakumara¹, L. N. A. De Silva¹, D. R. T. G. Ratnayake³ and
B. Alexander¹

¹*Department of Farm Animal Production and Health, Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka*

²*Ambewela Livestock Farms, Ambewela, Sri Lanka*

³*Department of Animal Production & Health, PO Box 13, Gatambe, Peradeniya, Sri Lanka*

The objective of this study was to investigate the conception rates of goats inseminated artificially after two estrus synchronization protocols. In protocol one; non pregnant female Sannan goats (n = 23) were synchronized for estrus using progesterone releasing intravaginal sponges (Flugestone acetate 30 mg). The sponges were kept in the vagina for 15 days and at the time of sponge removal 350 IU of Pregnant Mare Serum Gonadotropin (PMSG) was injected intramuscularly. The goats were transcervically inseminated 52-54 h after removal of the sponges using goat artificial insemination (AI) gun covered with a specific plastic sheath with a spike at the end. The spike facilitated the deep penetration of the cervix. Frozen thawed semen in mini straws were used with a concentration of 125 million sperms in a straw. Goats were injected with 50 µg of Gonadotrophin Releasing Hormone (GnRH) intramuscularly immediately after AI.

In the second protocol; non pregnant goats (n = 18) were synchronized for estrus using sponges kept in the vagina for 13 days. The goats were inseminated using same method described in the first protocol. Pregnancy diagnosis was carried out using ultrasound 45 days post insemination. Results revealed that conception rate in the first protocol were 60.9%, (14/23) whereas the conception rate in the second protocol was 22.2% (4/22). Significantly higher ($P < 0.05$) conception rate was observed in the protocol one compared to that of the protocol two.

In conclusion, this study highlighted that significantly higher conception rates can be achieved in artificially inseminated goats when progesterone sponges were used for 15 days instead of 13 days with inseminations carried out 52-54 hrs after removal of progesterone device.

Acknowledgments: Council for Agricultural Research Policy (CARP) and University Research Grants, University of Peradeniya

EFFECTS OF DIETARY INCLUSION OF RED RAW RICE POLISH AND WHITE RAW RICE POLISH ON GROWTH PERFORMANCE OF BROILER CHICKEN

P. B. A. J. Wickramasooriya¹, N. Priyankarage², S. P. Gunarathne³ and S. S. P. Silva²

¹Government Veterinary Office, Department of Animal Production & Health, Galagedara, Sri Lanka

²Veterinary Research Institute, Department of Animal Production & Health, PO Box 28, Gannoruwa, Peradeniya, Sri Lanka

³Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka

Rice polish is a by-product of rice and during polishing about 6-8% of rice bran and 1-3% of rice polish is produced. Separation of bran and polish is dependent on the milling process and under the local condition it is not an easy task to separate bran from polish due to the unavailability of sophisticated mills.

Rice polish is widely used in animal feed production as an energy supplementary feed ingredient. Different types of rice polish are available in Sri Lanka, however their effects on animal performance have not been evaluated previously. Therefore the study was conducted to evaluate the effects of dietary inclusion of red raw rice polish (RRP) and white raw rice polish (WRP) on growth performance of broiler chickens in a dose response trial.

Total of two hundred forty day old chicks were randomly divided into twenty-four experimental units with ten chicks each. Both RRP and WRP were incorporated into broiler diets at 10, 20, and 30 percent levels replacing the dietary maize. The experimental units were randomly allotted to the six diets such that there were four replicates on each diet. Each bird had free access to its respective experimental diet and water for six weeks period. Weekly feed intake, body weight were measured and feed conversion ratios were determined during the experimental period. Results were statistically analyzed using Genstat statistical package.

Inclusion of red raw rice polish and white raw rice polish in broiler diets at 10, 20, and 30 percent levels did not show any great difference in overall feed intake, live body weight gain and feed conversion ratio. However, a slight numerical difference could be seen. The statistical analysis revealed no significant difference ($p < 0.05$) between treatments.

The finding of study suggests that inclusion of RRP and WRP with different levels did not show any influence on feed intake, live body weight, and feed conversion ratio.

FORMULATION OF DENSE TOTAL MIXED RATION (TMR) BLOCKS FOR RUMINANT FEEDING

W. M. P. B. Weerasinghe, G. G. C. Premalal, N. Priyankarage,
M. W. C. D. Palliyeguru, A. P. D. G. Pathirana and A. K. M. Navarathna

*Veterinary Research Institute, Department of Animal Production & Health, PO Box 28, Gannoruwa,
Peradeniya, Sri Lanka*

In line with growing demand for milk and milk products and efforts taken to increase the production, there is a progress in dairy farming in the country during recent years. However, unavailability of quality ruminant feeds in sufficient quantities is considered as one of the major constraints for the development of the dairy sector. Some feeds, especially roughages are seasonally available in large quantities, but due to non-adaptation of conservation measures, they are not efficiently utilized. In addition, there are some attempts to produce good quality hay and concentrates, but handling, storage and transportation of these low density feed materials become a major constraint in the commercialization of ruminant feed industry. One of the methods to overcome those difficulties is a formulation of total mixed ration (TMR) with hay and concentrates and compressing them into high-density blocks. Therefore, the objective of the current study was to formulate and prepare dense TMR blocks using locally available roughages and concentrates for ruminant feeding.

Grass hay was produced from *Bracharia ruziziensis* and *Panicum maximum* harvested at 10% blooming. Concentrate feed mixture was prepared using coconut poonac, rice polish, maize, urea and mineral mixture, predicted to contain 16.5% crude protein, 5.5% fat, 87% dry matter and 3.2 Mcal/kg of digestible energy for ruminants. Two TMR formulae were calculated with hay and concentrate feed at different ratios. Formula 1 consisted of *Bracharia ruziziensis* hay and concentrate feed at 50:50 ratio (dry matter basis) and formula 2 consisted of *Panicum maximum* hay with the concentrate: forage ratio at 60:40. Hay was cut into average 12cm particles with a hay cutter and manually mixed with concentrate feed. The TMR mixture was then pressed into 5 kg dense blocks using a hydraulic coir dust pressing machine at the pressure of 400psi. The resulting blocks were sealed using a polythene sheet and block measurements were taken. Blocks made for 5kg were 30x30x15cm in size and could easily handle and transport. Due to low moisture content (15%), the blocks can be stored for certain periods of time and durability studies are currently being undertaken.

It can be concluded that dense TMR blocks can be successfully made using correct machinery and suitable formulae according to animal requirements, though further studies are needed to examine the intake and performance by ruminants.

INVESTIGATION OF MOST PROBABLE FACTORS FOR DEVELOPMENT OF CHRONIC MASTITIS IN CENTRAL PROVINCE OF SRI LANKA

D. S. Thilakarathne¹, W. S. N. Gunawardana¹, P. Abeynayake¹ and
I. S. Abegunawardena²

¹Department of Veterinary Public Health and Pharmacology, ²Department of Basic Veterinary Sciences, Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka

Bovine chronic mastitis refers to an inflammatory condition in the udder that has a high chance of being resistant to therapy. Culling the affected cows has been advocated owing to high treatment costs, production losses and high chance of spreading mastitis cases in the herd, all of which contribute to a severe economic burden on the farmer. Thus it is important to investigate the most probable reasons for treatment failures to minimize the economic losses associated with bovine chronic mastitis (CM). This study was aimed to disclose the factors leading to development of CM.

Two hundred and twelve cattle farms selected through multistage sampling were investigated. In these farms 379 milking cows were screened by California Mastitis Test. Considering their history, 23 CM cows were identified. Owners of identified CM cows were interviewed using a structured questionnaire to collect information on risk factors for development of CM. A milk sample from each cow was cultured for isolation and identification of bacteria at genus level. Antibiotic susceptibility profiles of isolates were determined according to the standards given by Clinical and Laboratory Standards Institute.

Some of the identified causes as revealed by further investigation include inappropriate treatments such as indigenous medicine (5/23), discontinuous treatment or not following full course of treatment (4/23), non-veterinarians interventions (7/23) and continuous exposure to the pathogen due to unhygienic management practices (14/23). Although farmers reluctant to agree, late observation of the case and not seeking veterinary advice at critical time account for considerable proportion of cases. Development of antimicrobial resistance in the causative organisms was highly significant. Almost half (50%) of the samples had at least one resistant type of bacteria and 30% of the samples had multi drug resistant bacteria.

It is clear that there is a tendency of developing resistance among mastitis causing bacteria to commonly used antimicrobials. In addition, malpractices of farmers should be minimized as we cannot control the emergence of resistance.

**STUDY ON PRODUCTION TRAITS AND MANAGEMENT PRACTICES
OF LAYER BIRDS DISTRIBUTED BY THE DIVINEGUMA
PROGRAMME IN RATHNAPURA DISTRICT DURING 2011**

M. I. G. Jayathilaka¹ and R. P. M. Pathirathna²

¹*Deputy Director's Office, Department of Animal Production and Health, Muwagama, Rathnapura, Sri Lanka*

²*Department of Animal Production & Health, Sabaragamuwa Province, Provincial Council Complex, Ratnapura, Sri Lanka*

A descriptive cross sectional study was conducted in order to identify the production traits and management practices of the layer birds of newly implemented programme, Divineguma in selected Veterinary Surgeons' (VS) ranges in Ratnapura district. The study period was from October to December 2011. A total of 1980 layer birds, were distributed in August 2011 among 198 farmers of nine VS ranges under this programme. The stratified random sampling method was used to select 96 poultry farmers who benefited from the Divineguma programme in seven VS divisions for the study. The primary data was gathered directly from the farmers through personal interview method aided by a pre tested, multiple-choice questionnaire. The questionnaire consists of three parts as; general demographic characters, layer management practices and details of egg consumption pattern. The secondary data was gathered from the records maintained at the relevant veterinary offices.

The demographic characteristics shows that the 47% of farm holders were women and 53 % were men. Most of the farmers (30%) were over fifty years of old while 27% and 28% of them were in (31-40), (41-50) age groups respectively. Majority of famers' possessed good educational qualification. Sixty eight percent has showed qualification of or beyond G.C.E. ordinary level, while 32% showed qualification below the ordinary level. Majority (58%) of farmers had some experience in poultry farming. Majority of birds (61.7%) has started laying at the age group of 18-20weeks and 23.5% started laying beyond 20 weeks of age. some layers started laying before 18 weeks of age (6.2%). Daily average egg production per farm was 6 eggs. Average weight of an egg was 50.7g. Hen day production was 64%. Most of the poultry houses (67%) were in good condition while 30% were moderate and 3% shows poor housing condition. Poultry litter application was adequate in 89% of houses while, 11 % shows inadequacy of the litter. Majority of farmers used paddy husk as the litter material. Nest boxes were present in 46% of houses. Fifty one percent of farmers provided 1.2 kg of feed per flock (10 birds) per day while 27 % and 22% of farmers provided less than 1.2kg and greater than 1.2 kg of feed respectively. Forty seven percent of farmers said that the cost of feed was the major constraint and 13%, 19% said low availability of litter and delay of egg laying as the main constraints respectively.

Average weight of an egg in the sample (50.7g) in the age group of 16 to 24 weeks is in normal range and comparable with the standard (43.9 to 56.8g). Average body weight of a layer was 1.2 kg (1.25 to 1.30kg), which is closer to the lower margin of the reference point. Feeding & housing management were good. The higher feed cost was the common constraint found. Majority of the farmers consumed eggs yet, the consumption pattern was below the standard which is 3 eggs per week. Only 39 % had consumed the recommended level. The overall conclusion from the study is that the production performance of the layers and the existing management practices are close to expected level.

CAPTIVE BREEDING OF BROWN FISH OWL (*BUBO ZEYLONENSIS ZEYLONENSIS*) IN DEHIWELA ZOO

P. Arunthathy, N. K. Pathmasiri and R. Jayalath

Department of National Zoological Gardens, Dehiwela, Sri Lanka

The Brown Fish Owl (*Bubo zeylonensis*), belonging to the family Strigidae which was categorized under the genus *Ketupa* though currently categorized under the genus *Bubo* (Eagle owls).

Brown Fish Owls at the National Zoological Gardens are in a colony of 12-13 and are managed within a cage with a height of 9' 8", width of 12' 5" and length of 24'. The cage is covered with 2"X2" wire mesh. This enclosure is furnished with tall tree branches and logs. These birds are fed once daily with fish and chicken meat late in the evening. In addition, they are fed with live day old chicks and rats as live pray, once in two months. Supplementary vitamins are added to the meat daily and the birds are de-wormed once in three months.

It has been noticed that the female Brown fish owl in the zoo lay 1-2 eggs at a time and they breed during November to March, which is in agreement with the literature. Though the literature state that these owls lay eggs in old trees, often in old nests of other birds, rock crevice or similar places, our findings in this regard were on the contrary. During the observation period (2003- 2012), these birds laid eggs annually, on the ground behind a particular log while only once an egg was laid on an open ground indicating that the female possibly had selectivity for the brooding site.

The observed incubation period for eggs of Brown Fish Owl varied between 28-38 days while the published references indicated this to be an average of 38 days. It was observed that the incubation was curtailed when the female got disturbed.

Though the conservation status of Brown Fish Owl has been categorized under the Least Concern category by the IUCN, the loss of habitat is a threat to survivorship of this species. Information on breeding of this sub species (*Bubo zeylonensis zeylonensis*) has not been reported in Sri Lanka.

COMPARISON OF BUTTERFLY DIVERSITY IN TWO DIFFERENT HABITATS IN GANNORUWA FOREST

¹H. K. Umasha S. Hemachandra, ²N. K. Jayasekara and ³K. B. Ranawana

¹*Pet Vet Clinic, 421/5, Malasekara Mawatha, Colombo 07, Sri Lanka*

²*Department of Basic Veterinary Sciences, Faculty of Veterinary Medicine & Animal Sciences, University of Peradeniya, Sri Lanka*

³*Department of Zoology, Faculty of Science, University of Peradeniya, Sri Lanka*

This study was conducted to determine the most suitable habitat to observe butterflies by comparing their diversity in two different habitats (home garden and natural forest) in Gannoruwa forest reserve (7^o 287' N and 80^o 592' E) in the vicinity of Kandy.

The observations were carried out from June to July in 2006. Butterflies were observed in four randomly selected plots in each habitat. At each sampling point, butterflies were observed for thirty minutes in a circular plot having 10 meter radius. Repeated observations were carried out for six days for each habitat. In addition, the behavior and nectar/larval food plants of butterflies (when one or more butterflies were observed frequently on the stem or leaves of the particular plant) were observed and recorded whenever possible.

Of a total 806 observations, the individual numbers of butterflies recorded in home garden and forest habitats were 442 and 364 respectively. A total of 37 species were identified of which two were endemic and seven were nationally threatened. Two species found in the forest were unidentified. Of the observed species, 64% (n=25) were encountered in both habitats, 28% (n=11) were only found in the forest habitat and 8% (n=3) were only found in the home garden habitat. Thus, 92% of all observed species were found in the forest habitat and 71% were found in the home garden. The Shannon index of diversity (forest – 3.096; home garden – 2.793) and the Shannon evenness index (forest – 0.871; home garden – 0.838) were higher in the forest habitat. In the forest, butterfly diversity was greatly determined by more nectar/larval food plants availability. During the study period, 21 species of plants were identified as nectar plants, of which 11 were found only in the forest and four were found only in the home garden. Seven species were found in both habitats. Therefore, according to the findings of this study, the best habitat to observe a higher number of species of butterflies is the natural forest habitat in the Gannoruwa forest patch which provides a wider variety of niches.

QUALITY OF DEEP FROZEN SEMEN USED IN ARTIFICIAL INSEMINATION OF CATTLE IN THE CENTRAL PROVINCE, SRI LANKA

G. H. T. A de Silva¹, W. W. Abeygunawardena², R. M. S. Malkanthi¹
and A. D. N. Chandrasiri³

¹*Veterinary Research Institute, Department of Animal Production and Health, PO Box 28, Gannoruwa, Peradeniya, Sri Lanka*

²*Central Artificial Insemination Centre, Department of Animal Production and Health, Kundasale, Sri Lanka*

³*Department of Animal Production and Health, PO Box 13, Gatambe, Peradeniya, Sri Lanka*

Artificial Insemination (AI) is the most widely used technique for the genetic improvement of cattle. It has been accepted that for a successful attempt of an AI, at least 40% sperms show progressive motility at the time of an AI. The aims of present investigation were to assess the quality of deep frozen semen in the veterinary ranges in the Central Province, Sri Lanka and to determine whether proper semen storage practices are been adopted at field veterinary (VS) offices in the Province.

Samples were collected from all the veterinary offices in the province and each office was visited three times during the study period. After analysing 267 semen samples for sperm motility, it was revealed that the progressive motility at the VS office level varied from 0% to 60% with a mean progressive motility of 53% \pm 12.3% (Mean \pm SD). In this study it was revealed that 95% of the semen straws were showing sperm motility above 40%, which is considered to be good in quality. Furthermore, the study revealed that management of semen storage tanks was fairly good in most of the VS offices. A long work experience (more than 10 years) of the most of the AI technicians (about 80%) was identified as a reason for proper management of semen storage tanks. Nevertheless, none of the VS offices had displayed work instructions for the workers at the VS offices on proper handling of semen. Furthermore, only 14% of the VS offices had a proper system for identification such as labeling the canisters to readily locate the desired straw in the storage tank. From these observations, it was concluded that management of frozen semen during storage and handling at the VS offices need to be further improved to ensure efficient AI service.

DETERMINATION OF SERUM CALCIUM (Ca) AND PHOSPHOROUS (P) LEVELS OF DOGS RAISED WITH OR WITHOUT PROVISION OF MINERAL SUPPLEMENTS

A. A. D. T. Chandrasiri¹, D. A. Satharasinghe¹, G. A. Prathapasinghe²,
N. A. Y. Wasantha Kumara³ and L. J. P. A. P. Jayasooriya¹

¹*Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka*

²*Department of Livestock and Avian Sciences, Wayamba University of Sri Lanka, Makandura, Sri Lanka*

³*Veterinary Surgeon, Municipal Council, Kandy, Sri Lanka*

Maintenance of blood Calcium (Ca) and Phosphorus (P) levels in appropriate levels in dogs is paramount important, because deficiency, excess and improper Ca:P ratio will end up in osteopathies such as reduced bone mass, bone deformities, exostoses, pathologic fractures, and loose teeth (rubber jaw). It is a common practice by pet owners to supplement Ca and P and other minerals by using commercially available mineral supplements, because routine rations given for dogs may consists of low levels of minerals. However, bioavailability of different minerals in individual mineral supplements may vary depending on the quality of raw materials that have been used for the formulation of the mineral mixtures. Thus, the objective of the current study was to compare the levels of serum Ca and P of dogs that are being given with different commercially available mineral supplements for a long period of time and to compare those with dogs that were not given any mineral supplements for the same period. Twenty five animals that were presented to a private animal hospital for routine check-ups were selected for the study. Out of them, five animals have not been given any mineral supplement for the six months of period prior to the study. In the other sample of twenty (20) animals, four groups of animals with n=5 per each group had been given different commercially available mineral supplements. After obtaining the consent from the clients, the blood samples were obtained for the analysis of mineral levels of blood. At the same time, further details on the nutritional management of the animals were also collected. The serum samples were analyzed using colorimetric method for the determination of Ca and P. The results revealed that the Ca and P levels in majority of animals that have given supplements were within the normal ranges (Ca; 9-11.3mg/dl, P; 2.6-6.2mg/dl); but few animals that have been given different commercially available supplements showed deviated Ca and P values from the normal range. Interestingly, in the group that has been not given any mineral supplement (E), all the animals were deficient in Ca levels and few had excess P levels. The reduction of Ca level in that group was statistically significant ($p^* < 0.05$) as compared with all other groups (A; 10.35 ± 0.50 ., B; 10.51 ± 0.39 ., C; 10.97 ± 0.28 ., D; 11.15 ± 0.61 ., E; $7.73 \pm 0.36^*$ mg/dl). The results of this study clearly indicate the fact that the supplementation of minerals is essential for avoiding a Ca deficiency and Ca and P imbalance in dogs.

EFFECTIVE RABIES CONTROL IN STRAY DOGS: CULLING vs. VACCINATION

G. S. S. Gunawardana, C. J. Samarasinghe and Y. G. K. De Silva

*Humane Dog Population & Rabies Control Project, Blue Paw Trust, 30/42, Longdon Place,
Colombo 07, Sri Lanka*

According to the data available at Colombo Municipal Council(CMC), during the period from 1990 to 2006, a total of 38,172 stray dogs have been eliminated by CMC, with an annual average of 2245 per year. During this period, within Colombo Municipality area, a total of 652 dogs were confirmed as rabies positive by Medical Research Institute (MRI) with an annual average of 38 cases.

In June 2007 a scientific holistic approach in Rabies control was introduced, which consisted of dog population surveys, vaccination, sterilization and educating the public. Neutering of female stray dogs was used throughout, while from 2009, immunization was also introduced. Well-trained Animal Control Operatives (ACOs) are used to humanely capture stray dogs using internationally accepted dog catching nets. An anti rabies vaccine with Duration of Immunity (DOI) of three years is being used to vaccinate such stray dogs.

Since 2009 an annual average of 3545 stray dogs, which is approximately 90% of stray dog population within Colombo city limits, had been vaccinated. After initiating this project, 33 rabid dogs were reported in 2007, which reduced to 17 in 2008, was 22 in 2009 and was 10 in 2010. Out of the 10 reported in 2010, seven were stray dogs. In 2011, eight dogs were confirmed as rabid, out of which only three were stray dogs.

This shows herd immunization of stray dogs, against rabies with a vaccine, which has long DOI, coupled with surgical sterilization could control incidence of rabies with compared to mass culling.

OCCURRENCE OF AVIAN HAEMOPARASITIC INFECTIONS IN CASES REPORTED TO PATHOLOGY LABORATORY OF THE VETERINARY RESEARCH INSTITUTE

S. M. T. S. Manchanayake¹, G. I. S. Perera¹, H. Kothalawala¹, W. M. P. Bandara¹,
L. Perera² and L. M. P. Wijemanna³

¹Veterinary Research Institute, Department of Animal Production & Health, PO Box 28, Gannoruwa, Peradeniya, Sri Lanka

²Veterinary Investigation Center, Department of Animal Production & Health, Matara, Sri Lanka

³Veterinary Investigation Center, Department of Animal Production & Health, Chilaw, Sri Lanka

Intracellular protozoa of the genera *Plasmodium*, *Haemoproteus* and *Leucocytozoon* are considered less pathogenic in wild birds. However, these parasites could cause severe fatalities in captive birds, particularly when European breeds are introduced into endemic areas. Generally, the infection is manifested by lethargy, weakness, listlessness, lameness in one or both legs, watery secretions in nostrils and pallid combs and wattles. *Plasmodium* and *Leucocytozoon* infections were reported in Sri Lanka previously and several outbreaks with clinical picture suggestive of the above parasitic infection have been reported in the country in the recent past. The objective of the present study was to identify the haemoparasitic genera in poultry presented with clinical manifestations suggestive of haemoparasitic infection. From May to December 2011, poultry tissue samples (n=54) from 29 suspected outbreaks were received from Central Veterinary Investigation Center and Veterinary Investigation Centers of Matara, Chilaw and Welisara. Pale carcasses, hepatomegaly, splenomegaly, and haemorrhages in liver, proventriculus, thigh muscles and perirenal area were observed during postmortem examinations. Samples of liver, spleen, lung, kidney, brain and bursa of fabricius were collected in 10% formal saline for histopathology and stained with haematoxylin and eosin and examined microscopically. *Plasmodium* species were observed in 12 blood smears. The histopathological changes observed in tissues were extravasations of red blood cells (n=17), vascular congestion (n=10), presence of haemozoin (n=13), lymphocytic infiltration (n=3) and fibrosis (n=2). Megaloshizonts were found in 11 tissue samples; liver (n=06), spleen (n=03), brain (n=01), Bursa of fabricius (n=01) of 10 birds. Megaloshizonts were present either singly or clustered within tissues and the host cell type of this parasitic stage could not be determined since they are enlarged or destroyed. Morphologically the megaloshizonts were identified as belonging to the genus *Leucocytozoon*. However, gametocytes of *Leucocytozoon* species were not detected in the blood smears observed. The clinical disease was controlled after treating with primaquine, chloroquine and sulphonamide-trimethoprim combinations. The clinical picture and histopathological findings along with response to treatment are suggestive of presence of *Leucocytozoon* infection among poultry in Sri Lanka. Further epidemiological investigations and species identification are necessary to evaluate the pathogenesis of the organism.

BOVINE TUBERCULOSIS: INVESTIGATION OF CASES WITH HISTORY OF CHRONIC RESPIRATORY DISTRESS

M. D. N. Jayaweera¹, J. K. H. Ubeyratne¹, G. I. S. Perera¹,
S. M. T. S. Manchanayake¹ and J. Elvityigala²

¹ *Veterinary Research Institute, Department of Animal Production & Health, PO Box 28, Gannoruwa, Peradeniya, Sri Lanka*

² *Central Chest Laboratory, Welisara, Sri Lanka*

Investigation of bovine cases with chronic respiratory distress was commenced since December 2011 when samples were received from affected cattle in several livestock farms in North western and Central provinces. The initial source of all affected animals was one of the farms belonging to National Livestock Development Board in Central province. Out of 16 animals originated from the above farm, 4 animals died and one animal showing similar symptoms with extreme emaciation and respiratory distress due to this chronic condition was euthanized. It was noted at the post-mortem, that multiple caseous whitish nodules were scattered throughout the parenchyma and bulged out from the capsular surface in affected organs such as lungs, lymph nodes, heart, liver and spleen. Histopathological examination revealed the presence of acid fast bacilli in granulomatous lesions from all organs. The culture was positive for *Mycobacterium* spp. The identification of particular species of *Mycobacterium* bacteria is under investigation.

EFFECT OF TWO TIER FEEDING WITH FORMULATED CREEP FEED AGAINST SINGLE TIER FEEDING ON WEANING WEIGHTS OF PIGLETS

K. P. L. K. Pathirana¹, S. S. P. Silva², S. Premaratne¹ and Y. M. Wickramasingha¹

¹*Department of Agriculture System, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura, Sri Lanka.*

²*Veterinary Research Institute, Department of Animal Production & Health, PO Box 28, Gannoruwa, Peradeniya, Sri Lanka*

Weaning weight and age are two important determinants of market age and weight of fatter pigs. It is common practice to feed single starter feed for piglets until weaning though the nutrient requirements vary during this period. A study was carried out to find out if two tier feeding regimes with a creep feed will improve the weaning weight of piglets. A least cost standard creep feed and a starter diet were formulated using locally available ingredients. New feeding regime (Treatment) was compared with existing regime (Control) in randomly selected eight litters. Diets were fed from day five to weaning (day 40). For treatment group creep feed was given for first five days (5-10 days) and formulated starter diet for rest of the period where as for control existing single tier starter was fed throughout. Body weight gain, body length, heart girth, feed intake and mortality were recorded. Data were analyzed using one-way ANOVA with aid of Genstat Statistical Software. Piglets fed on treatment diets grew much faster than their counterparts fed on control diet and on day 40, average weight of piglets of treatment group was significantly heavier ($P < 0.05$) than that of control group (7.45 vs 5.81kg). The piglets fed two tier feeds (Treatment) converted feeds more efficiently than the piglets fed single tier feed (Control) ($P < 0.05$). Body conformity measured in form of body length (17.45 vs 15.32 cm) and heart girth (15.81 vs 13.38 cm) was higher ($P < 0.05$) in treatment group than that of control. Mortality was lower ($P < 0.05$) in treatment litters than in the control litters. Feeding a creep feed improved the piglet weights substantially (28%) and the number weaned. It can be speculated that spending some extra money for a creep feed would generate more returns by weaning more piglets and achieving market weights early.

FELINE PERINEAL URETHROSTOMY

D.M. Siriwardane

Pet Vet Clinic, 421/5, Malalasekere Mawatha, Longdon Place, Colombo 7, Sri Lanka

Perineal urethrostomy is indicated to prevent recurrent obstruction in male cats or to treat obstruction that cannot be eliminated by catheterization. Urethral obstruction or stenosis can be sequelae of Feline Lower Urinary Tract Disorders (FLUTD), most commonly to idiopathic disease. The commonest location for obstruction is the penile urethra. Surgical technique involves the mobilization of the wide pelvic urethra, creation of a new stoma by suturing the urethral mucosae to the perineal skin and removing the narrow penile urethra to maintain patency.

Four cats presented with recurrent urethral obstruction (A, B, C, D,) were subjected to surgery at Pet Vet Clinic. Cat A (age 7 years) did not respond to initial medical treatment and had repeated obstructions. Cat B (age 3 years) responded to initial medical treatment but had repeated obstructions despite the medical management for 4 years. Cat C (age 7 years) and Cat D (age 12 years) did not have a previous history of obstruction but were presented with repeated obstructions over the course of a few weeks.

Stricture formation (serious) and Urinary Tract Infection (frequent) are possible complications following surgery. Cats A and C did not have complications following surgery and have normal urine flow to date. Post surgical Urinary Tract Infection (UTI) was observed in cat B and D. Cat B showed signs of Idiopathic FLUTD three times, despite the surgery. Medical management resolved the condition. However, nine months after the surgery there was stricture formation and further revised surgery was required. Cat D showed stricture formation within four weeks of surgery and required two revision surgeries. Both cats B and D are stable with good urine flow to date.

In some animals complete remission of FLUTD is expected post surgically, while in others recurrence of FLUTD can occur. Medical management of recurrent FLUTD and proper surgery can reduce the incidence of feline urethral obstruction. Client education and compliance, with ongoing monitoring, will help affected cats to lead a life with improved quality.

ONE STEP PCR METHOD FOR RAPID IDENTIFICATION OF *CLOSTRIDIUM CHAUVOEI* FROM INFECTED BOVINE MUSCLE TISSUE SAMPLES

J. K. H. Ubeyratne and M. D. N. Jayaweera

*Veterinary Research Institute, Department of Animal Production & Health, PO Box 28, Gannoruwa,
Peradeniya, Sri Lanka*

Clostridium chauvoei is a spore forming anaerobic bacterium and is the causative agent of Blackleg. Blackleg is a notifiable livestock disease in Sri Lanka and it is controlled by vaccination in the affected areas. Accurate and rapid disease diagnosis is a crucial factor concerning the elimination and controlling of the disease outbreaks. Laboratory testing using animals are practiced in order to diagnose diseases and the usage of laboratory animals for diagnosis is becoming limited due to animal welfare issues. Demarcation of organisms is difficult using traditional microbiological methods as these diagnostic methods are both time consuming and laborious. It is also important to have a pure culture of the strain, which require extra time for culture. Blackleg causative agent of *Clostridium chauvoei* is difficult to distinguish from the causative clostridia of malignant oedema. The ability of PCR to amplify DNA specifically from low numbers of bacteria, as well as its accuracy, simplicity, rapidity and reproducibility, offers advantages over conventional methods for identification and it is independent of contaminating flora. Therefore, a single step PCR system was established for specific detection of *Clostridium chauvoei* evading guinea pig inoculation and biochemical identification. The results suggest the PCR system may use for detection of *Clostridium chauvoei* from the animals affected with Blackleg.

PREDICTION OF BODY WEIGHT OF JERSEY CATTLE USING MORPHO-METRIC MEASUREMENTS

W. M. S. P. Weerasinghe¹, C. M. B. Dematawewa², G. H. T. A. De Silva¹,
R. M. S. Malkanthi¹, K. Harendra¹ and A. D. N. Chandrasiri³

¹ *Veterinary Research Institute, PO Box 28, Gannoruwa, Peradeniya, Sri Lanka*

² *Department of Animal Science, Faculty of Agriculture, University of Peradeniya, Sri Lanka*

³ *Department of Animal Production and Health, Gatambe, Peradeniya, Sri Lanka*

Body weight estimation for dairy cattle is a crucial measurement in order to develop many protocols for dairy production. However, weighing scale may not always be available hence; a reliable means to determine body weight indirectly will prove useful in this situation. This study aims to develop a new indirect and non-invasive method of determining body weight and compare this with several established methodologies.

A set of 326 female Jersey cattle with <3m (n = 20), 3-24m (n = 81) and >24m (n = 215) heads were used in the study. Actual body weight of individual animals was determined using a weighbridge. Predicted body weights were determined using a weigh-band and morpho-metric measurements utilizing body length, height at withers and heart girth. Regression and correlation analysis was used with single, double and three measurements to determine the most suitable model. All models were compared using coefficient of determination values (R^2) to select the best model in predicting body weight for each age group.

Regression analysis of the weigh-band reading and actual weight indicated that weight increases at a rate of 14.6 kg per unit increase in weigh-band reading in all the data combined. The linear relationship was Actual body weight = (Weigh band reading - 14.655) / 0.95 with Coefficient of determination (R^2) of 0.9698 which was significant ($p < 0.01$)

The results imply that the use of the heart girth measurements in prediction of live weight of Jersey cattle is credible with linear and polynomial formulas. Non linear models (with single measurements) are better than the linear models and best with following measurement Predicted body weight = $0.0006 * HG^{2.58}$ ($R^2 = 0.992$, $p < 0.01$)

CAN ORGANIC TRACE ELEMENTS REPLACE ORGANIC MINERALS IN BROILER DIETS?

C. Senanayaka¹, S. S. P. Silva² and S. Premarathna¹

¹*Department of Agriculture System, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura, Sri Lanka.*

²*Veterinary Research Institute, Department of Animal Production & Health, PO Box 28, Gannoruwa, Peradeniya, Sri Lanka*

Trace elements fulfill specific physiological and biological functions in the body and deficiency leads to disturbances in many metabolic processes. The bio-availability of inorganic trace elements has been a concern and it is believed that organic sources can be more absorbable. Meanwhile in Sri Lanka most of the trace minerals in poultry feeds are coming from inorganic sources. However if the organic trace mineral could replace inorganic elements in poultry feeds, has not been assessed under local conditions. The effect of substituting inorganic trace elements with organic trace elements was studied in broiler chickens. Proprietary trace mineral premix, Bio-plex, in two inclusion levels (500g per ton or 750 g per ton), was used as an organic trace element supplement and compared against commonly used commercial inorganic trace element mixture (1000 g per ton). One thousand and two hundred day-old broiler chicks were allocated into 15 equal pens equipped with a brooder, lights, waters and feeders. On the same day birds were randomly allocated for three experimental diets (Diet 1(Control): Inorganic Trace elements 1kg /tone, Diet 2: Organic Trace elements, 500g / tone, Diet 3; 750g per ton of feed) and each diet was replicated five times. Weekly, feed intakes, body weights and deaths were recorded for 35 days. Data were analysed using One Way ANOVA. The body weights of chicks fed organic minerals were significantly heavier and feed conversion was better than that of control birds after seven days of feeding ($p > 0.05$). However, there was no significant treatment effect on any of the parameter measured from day seven to end of the experiment on day 35. It is apparent that inorganic minerals can be successfully replaced with organic minerals using half of the dose in broiler diets. Advantage of volume too can be very useful in effective feed formulation.

DIAGNOSIS AND CORRECTION OF ABOMASUM DISPLACEMENT IN HIGH PRODUCING DAIRY COWS IN SRI LANKA

A. M. P. Abeysinghe¹, J. Jeythiswaren² and M. P. K. Sanjeewa²

¹*Department of Farm Animal Production and Health, Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka*

²*Ambewela Livestock Farms, Ambewela, Sri Lanka*

Displacement of abomasum (DA) may occur to the left or to the right side, and the most common is the left displacement of the abomasum (LDA). This condition is almost entirely confined to dairy cattle and incidences are high during the first 6 weeks of lactation, but they may occur sporadically at any stage of lactation or gestation. Occurrence of LDA just before parturition would suggest that the presence of the gravid uterus or the process of parturition predisposes to the condition.

Twenty six (n=26) clinically suspected abomasum displacement cases occurred from 2006 to 2012 in high producing dairy cows in Ambewela and Pattipola farms. The clinical signs were reduced appetite, only eat less amount of grass, reject concentrates, sudden drop in milk yield, dull appearance, sprung left ribcage, normal temperature, pulse rate and respiratory rate. Rumen contractions were present with moderate strength.

Detailed clinical examination revealed that, high-pitched metallic tinkling (“ping”) sound over the left ribs 10 to 13 or from right side cranial to 8th rib. If the ping sound is heard from the left side, it is diagnosed as a left abomasum displacement (LDA). All the cases were diagnosed and confirmed as displacement of abomasums and the most common condition (n=20) were left displacement of the abomasum (LDA) and the rest (n=6) were right displacement of abomasum (RDA).

The available correction methods are casting and rolling, percutaneous fixation from abdominal cavity (Utrecht technique), midline percutaneous fixation through toggle technique and fixation of abomasum to right flank. Six RDA and 2 LDA cases of mid gestation cows were corrected by fixation of abomasums to right flank and 18 LDA were corrected by percutaneous fixation through toggle technique but 2 late pregnant cows were induced for parturition before the correction. All the cows recovered successfully after the correction and milk yields were improved with time.

OCCURRENCE OF *CLOSTRIDIUM SORDELLII* IN SHEEP AT MEDICAL RESEARCH INSTITUTE

R. Karunakaran, M. G. Thamitiyagodage, R. De. S. Seneviratna, W. G. S. S. Kumara,
T. K. Liyanage and Lilani Karunaratna

Medical Research Institute, Dr. Danister de Silva Mawatha, Colombo 8, Sri Lanka

The Animal Center of the Medical Research Institute (MRI) maintains sheep for providing blood to the government and private laboratories for the preparation of blood agar. The sheep are maintained under an intensive management system and there is a designated area for walking. A contractor provides their regular grass supply and they are fed on cut grass. After each blood drawing, haematonic mixture is given and their Packed Cell Volume (PCV) and hemoglobin content are measured regularly. Sudden deaths (n=3) were observed in animals since November 2011. Post mortem lesions were emaciated carcass with an enlarged abdomen, congested blood vessels and gelatinous fat was seen around the heart. Pneumonic patches, fatty and congested liver, enteritis with partially digested fiber, small amount of polythene bags in the rumen and congestion of the blood vessels at the neck of the rumen were also observed. Further, the thigh muscle was dark in colour but there was no gas bubbles or fluid.

A piece of dark muscle was aseptically collected and was sent to the anaerobic bacteriology division of MRI. Muscle tissues were grinded using a tissue grinder and inoculated into blood agar and Brucella blood agar with hemin and vitamin K. The plates were incubated in an anaerobic jar for 48 hours at 37 °C. After the incubation period grayish white colonies with a low convex area with spreading edges and a characteristic smell was observed. Gram's stain showed large gram-positive bacilli with sub terminal spores. The isolate was identified as *Clostridium sordellii* by using rapid ANA11 Kits (REMEL DIAGNOSTIC KITS).

INVESTIGATION ON THE INDIGENOUS CATTLE BREED AND ITS FARMING SYSTEM IN SOUTH EASTERN REGION OF SRI LANKA

M. A. Nadheer¹ and M. N. M. Fouzi²

¹*Government Veterinary Office, Addalaichenai, Sri Lanka*

²*Center for Aquatic Animal Disease Diagnosis and Research, Faculty of Veterinary Medicine & Animal Science, University of Peradeniya, Sri Lanka*

The present study was undertaken to investigate the indigenous cattle and its farming system to understand the present status of indigenous cattle farming in South Eastern region of Sri Lanka. A total of 40 indigenous white cattle were randomly selected in six villages. The local white cattle breed is native to the South Eastern region of Sri Lanka. Coat colour of the animals is entirely white and the tails switch is black in white cattle. The body is small, compact and not fleshy. The face is small and narrow and ears are small, the horns are small to medium curved inward or sometime outward with pointed tips. The hump is small in females and little developed in males. The tail is long which reaches below the hock level. Cows have small udder and teats. Aggressive temperament is the interesting behaviour of these animals.

Milk production of these white cattle is low and the total lactation yield ranges between 350 liters to 360 liters. Average daily milk yield is 1 to 2 liters and lactation period is 7 to 8 months. The age at first calving ranged from 3.5 to 4.5 years and the calving intervals is 1 to 2 years. Body length, height at withers and heart girth in adult cows averaged 106, 123 and 158 cm respectively. Male shows higher value in all morpho-metric measurements than those of cows.

Herds of these animals are managed mainly under extensive system, where herds are allowed to graze freely in jungle, sub jungle, paddy field, tank bunds and river banks. Marketing of milk is very informal, middlemen play a major role in purchasing and marketing the milk at farm gate at the rate of Rs. 35/=per litre. According to the observation made in this preliminary investigation, it could be revealed that indigenous cattle in South Eastern region of Sri Lanka is valuable and unique genetic resource which need proper attention in herd improvement and conservation program.

DOES CAPTURE, NEUTER, VACCINATION AND RELEASE BACK TO THE ORIGINAL ENVIRONMENT CAUSE AN INCREASED AGGRESSION IN FEMALE CROSSBRED DOGS

D. W. D. Subasinghe and K. K. R. Malkanthi

Blue Paw Trust, No. 30/42, Longdon Place, Colombo 07, Sri Lanka

Capture, neuter, vaccination and release (CNVR) is practiced in humane dog population management and rabies control projects. This study was undertaken to address the recent controversy in the Sri Lankan mass media with regard to the possibility of female cross bred dogs becoming more aggressive due CNVR, especially capture and related increase in aggression in dogs towards humans in comparison to a dog that is brought by an owner to a clinic to be sterilized with care (non CNVR). The cost of human post-exposure prophylaxis (PEP) is high in countries where rabies is endemic and an increase in the level of aggression of roaming dogs due to CNVR will be counterproductive.

Hypothesis – dog bites increase post sterilization due to CNVR intervention as opposed to owned dog sterilization in a clinic.

We have found that there are several categories of dogs in the streets and homes in Colombo. Owned-confined dogs; dogs kept inside premises and only leave the home on a leash with the owner in control. Owned roaming; owned but only partially contained, majority of the time roam freely without supervision. Community-roaming dogs; roam freely with multiple individuals or households claiming to feed the dog. Totally stray dogs; there is no caretaker for these dogs and they freely roam (feral – not included in study). The study was conducted by the authors personally interviewing the dog owners/caretakers about the behavior of the dog with special emphasis on the detailed biting behavior both before and after surgery. Dogs who had undergone CNVR were randomly selected from the Blue Paw Trust database from 2007-2011. Study data collection was performed during two months (January – February 2012). Owners/communities responsible for 151 female crossbred dogs were included in the study. Owned confined dogs were randomly selected from Embark adoption project (2011 surgically sterilized in the period 2010-2011) and Pet Vet Clinic Colombo surgery database (2010-2011). The survey included owned-confined (60), owned-roaming (24) and community-roaming (67) dogs. Of these, 85 (owned-confined (0), owned-roaming (24) and community-roaming (61); rest were hand caught for sterilization) were subjected to the CNVR program. The rest of the dogs (66 dogs) were non CNVR. The majority (91%) of dogs were sterilized after 6 months of age. The observations reported in the present study range from 3 months to 4 years post-sterilization.

The majority (71/85) of CNVR dogs had not bitten anyone before or after sterilization. Seventeen (owned-confined (2), owned-roaming (7) and community-roaming (8), of 151 (11%), had bitten humans before and/or after surgery up to the time of survey. However, the majority were reported from roaming dogs. Among the owned dogs (non CNVR) that bit humans; one dog did not change in its biting behavior due to sterilization and bit people before and after surgery. Whereas another dog started biting people after sterilization. Among the roaming dogs (all CNVR); 11 dogs (owned-roaming; 4 and community-roaming; 7) stopped biting behavior after sterilization. One dog from each category (CNVR and non CNVR) started biting humans post-sterilization indicating a possibility of aggression after surgery irrespective of the method of capture. Additionally 3 roaming dogs started biting humans after undergoing CNVR and all these dogs were owned roaming dogs. One dog in the community-roaming category bit humans before and after surgery with no change in behavior due to CNVR procedure. The majority of bites (82%), however, were avoidable: dog-provoked (50%), lactating female (18%), while consuming food (14 %). Only 18% of the bites were due to unknown reasons.

In conclusion, no significant increase in aggression was observed in CNVR or non-CNVR female crossbred dogs in Colombo. Exposure of roaming dogs to provocative incidents ensue in bites, especially from drunken individuals. Responsible pet ownership and bite prevention education must complement a CNVR program to reduce dog-bites in a rabies control project due to the majority of bites being preventable. Never to approach a dog with pups, not to provoke dogs and not to disturb or run near a dog eating its meal are simple principles in dog bite prevention that could have prevented these bites.