



**UNIVERSITY OF NAIROBI
COLLEGE OF AGRICULTURE AND VETERINARY SCIENCES
FACULTY OF VETERINARY MEDICINE**

PROCEEDINGS OF THE 7TH BIENNIAL SCIENTIFIC CONFERENCE

SEPTEMBER 8th TO 10th 2010

**DEPARTMENT OF PUBLIC HEALTH, PHARMACOLOGY AND TOXICOLOGY
AUDITORIUM**

KABETE CAMPUS

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THEME

ONE HEALTH IN A CHANGING ENVIRONMENT

**DEPARTMENT OF PUBLIC HEALTH, PHARMACOLOGY
AND TOXICOLOGY AUDITORIUM**

KABETE CAMPUS

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**THE 7TH BIENNIAL SCIENTIFIC CONFERENCE OF THE FACULTY OF
VETERINARY MEDICINE, 2010**

**THEME:
ONE HEALTH IN A CHANGING ENVIRONMENT**

WEDNESDAY 8th SEPTEMBER 2010

REGISTRATION: 8.00 a.m.

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WEDNESDAY

SEPTEMBER 8th 2010

8.30 a.m. WELCOME ADDRESS

**Chairman: Prof. P. K. Gathumbi
Master of Ceremony: Prof. G. K. Gitau**

SESSION 01 BASIC AND ANIMAL SCIENCES

Chairman Prof. D. Oduor-Okelo

8.40 a.m. Use of lesser bush baby (*Galago senegalensis*) in research.
Nyongesa, A.W.

8.50 a.m. Nitric oxide synthase 3 gene transcriptional regulation in pulmonary myofibroblast differentiation and its implication in pulmonary fibrosis.
Ochwang'i, D.

9.00 a.m. The Morphology of Olfactory Mucosa after Administration of Vinblastine Sulphate in Rabbits. **Kavoi, B.M.**

9.10 a.m. Investing in Science and Technology and Innovation for Socio-Economic Development. **Taracha, E.**

9.20 a.m. Challenges to Dairy Development in Rwanda: The Case of Nyagatare District. **Mbuza, F.M.B.**

9.30 a.m. Discussion

9.50 a.m. Presentation on Curriculum Benchmarking - by IUCEA Initiative

SESSION 02 OPENING CEREMONY

10.30 a.m. Chairman: Prof. P. K. Gathumbi.

Chairman of the Organizing Committee, FVM
Dean, Faculty of Veterinary Medicine
Principal, College of Agriculture and Veterinary Sciences
Vice-Chancellor, University of Nairobi
Guest of Honour – Minister for Livestock Development

11.00 a.m. Tea break and Poster Session

SESSION 03 CLIMATE CHANGE

Chairman Prof. S. M. Arimi

11.30 a.m. Keynote 1: Influence of Changing Climate on Occurrence and Distribution of Emerging Infectious Diseases. **Dr. Njenga Kariuki, CDC.**

11.45 a.m. Interlink Between The Changing Climate, Livestock Resources And Food Security. Director, KARI

12.00 noon Emergency Preparedness and Disaster Mitigation. Njue, S.

12.10 p.m. Discussion

12.30 p.m. Poster Session/Lunch Break

SESSION 04 CLIMATE CHANGE AND ENVIRONMENTAL HEALTH

Chairman Dr. Njenga Kariuki/ Dr. Karanja, D. N.

14.00 p.m. Keynote 2: Preparedness and Emergency Mitigation: Current and Future Trends in Changing Climate. **Kennedy Ondimu.**

14.15 p.m. Keynote 3: Transboundary Animal Diseases in Relation to the Changing Environment: Current Status and Future Trends. **Nyaga, P. N.**

- 14.40 p.m.** Emerging Trends of Tuberculosis in Kenya: The Human-Livestock Interlinkage. **Arimi, S. M.**
- 14.50 p.m.** Fish Diseases in Kenya: Current Status and Future Trends in Changing Environment. **Mbuthia, P. G.**
- 15.00 p.m.** Bioavailability of Cobalt and Anthelmintic Effects of Albendazole Fortified with Cobalt (Vermidan Super) in Sheep. **Nguta, J. M.**
- 15.10 p.m.** Stamp Out Sleeping Sickness (SOS): An Intersectoral Approach to Neglected Zoonotic Disease Control in Uganda. **Okello, A. W.**
- 15.20 p.m.** Aflatoxins in Animal Feed and Human Food in Changing Environment. **Kangethe, E.**
- 15.30 p.m.** **Discussion**
- 16.00 p.m.** ***Poster Session/Tea Break/Exhibitions***
- 17.00 p.m.** ***Cocktail-Vet Labs Sports Club***
- THURSDAY** **SEPTEMBER 9th 2010**
- SESSION 05** **ANIMAL PRODUCTS, FOOD SAFETY AND FOOD SECURITY**
- Chairman** **Wahome, R. G.**
- 8.30 a.m.** **Keynote 4:** Animal products, quality control and veterinary services in a devolved government. **Ithondeka, P. M., Director of Veterinary Services**
- 8.45 a.m.** **Keynote 5:** Fish Farming, Aquatic and Marine. **Director, Kenya Fisheries.**
- 9.00 a.m.** Food safety and food security linkage: A focus on livestock products. **Okoth P. M.**
- 9.15 a.m.** **Discussion**
- 9.30 a.m.** **Poster session**

10.00 a.m.	Tea Break
SESSION 06	HUMAN-WILDLIFE CONFLICT & EMERGING LIVESTOCK
Chairman	Dr. W. O. Ogara
10.30 a.m.	Keynote 7: Impact of climate change on human-wildlife conflict in Eastern Africa. Owiti, G. O.
10.45 a.m.	People, Livestock, and Wildlife: Existing Best Natural Resource Management Practices in Naibung'a and Namunyak Community Based Conservancies. Olesarioyo J. S.
11.00 a.m.	Wildlife Livestock Interphase in a Changing Environment. Muchemi, G.
11.10 a.m.	Discussion
11.20 a.m.	Bee Keeping Current Status and the Future Trends in Changing Environment. Moinde, j.
11.30 a.m.	The Potential of Stingless Bee as an Emerging Livestock. Asiko, G. A.
11.40 a.m.	Fish Production: Current Status and Future Trends in Changing Environment. Maina, J.
11.50 a.m.	Emerging Livestock: Current Status Global Perspective with a Local Focus. Gathumbi, P. K.
12.00 noon	Discussion
12.30 p.m.	Poster/Exhibition Session
13.00 p.m.	Lunch Break

SESSION 07

ANIMAL DISEASES

Chairman

Prof. L. C. Bebora

14.00 p.m.

Keynote 8: Prevalence of Caprine Arthritis-encephalitis in Imported Dairy Goat Establishments in Tanzania. **Arsen, R. M.**

14.15 p.m.

Major causes of calf mortality in peri-urban area of Nairobi, Kenya. **Gitau, G. K.**

14.30 p.m.

Mycobacterium avium subsp. *paratuberculosis* detection in Saudi camel herds using Zeihl-Nelseen, ELISA and PCR diagnostic methods. **Mufareej, S. I. A. A.**

14.40 p.m.

Discussion

SESSION 08

EMERGING TRENDS IN ANIMAL BREEDING AND REPRODUCTIVE HEALTH

Chairman

Prof. G. J. O. Agumbah

14.45 p.m.

Keynote 9: Pregnancy rates of Cattle Synchronized Using GnRH and One Injection of PGF2alpha versus two injections. **Mgongo, F. O.**

15.00 p.m.

Fertility Control: The Male perspective. **Onyango D. W.**

15.10 p.m.

Adverse effects of indoor confinement on reproductive performance and hormone levels in the helmeted guinea fowl (*numida meleagris*). **Kimata, M. D.**

15.20 p.m.

Examining the Linkages Between Draught Animal Welfare and Human Livelihoods: Examples of Successful Community Based Interventions in Kenya. **Okello, W. O.**

15.30 p.m.

Discussion

16.00 p.m.

Poster/Exhibition/Tea Break

FRIDAY

SEPTEMBER 10th 2010

SESSION 09

ANIMAL HEALTH

Chairman

Dr. S. G. Kiama/Prof. S. M. Kisia

8.30 a.m.

Willingness to pay for CBPP vaccine and vaccination in Narok District of Kenya: An application of Conjoint Analysis contingent Valuation method (CJA-CVM). **Kairu-Wanyoike, S. W.**

8.40 a.m.

Challenges to Dairy Development in Rwanda – The Case of Nyagatare District. **Mbuza, F. M. B.**

8.50 a.m.

Biotechnology and Animal Health: Which Way Forward For Kenya? **Oluga, A. G.**

9.00 a.m.

Molecular characterization to identify the genotypic diversity within the Infection and Treatment Method (ITM) vaccine for East Coast fever using micro- and minisatellite markers. **Lubembe, D. M.**

9.10 a.m.

Collection, Serotyping And Characterization of Foot-and-Mouth Disease Virus in Circulation in the Somali-Ecosystem In Kenya. **Chepkwony, E. C.**

9.20 a.m.

Screening and Identification of Potential Probiotic Bacteria for Use as Biological Control Agents in Aquaculture in Uganda. **Nakavuma, J. L.**

9.30 a.m.

Discussion

10.00 a.m.

Tea Break

SESSION 10

VETERINARY EDUCATION

Chairman: Prof. Susan Mbugua

10.30 p.m.

Keynote 10: Veterinary Education and Training: Remaining Relevant in Changing Demands for Veterinary Service Delivery- Munene .J (**Dean FVM, Nairobi**)

10.40 a.m.	Discussion
SESSION 11	ETHNOVETERINARY MEDICINE AND ANIMAL DISEASES
Chairman	Dr. J. M. Mbaria
10.50 a.m.	Ethno-Veterinary Medicine: The Prospects of Intergrating Medicinal Plants Products in Veterinary Medicine in Kenya. Gakuya, D. W.
11.00 a.m.	Medicinal Plants Used By Traditional Birth Attendants For The Management Of Pre, Intra And Post Partum Complications In Machakos District, Kenya. Kaluwa, C.
11.10 a.m.	Responding to Challenges in Worm Control for Donkeys in Kenya. Kirui, G.
11.20 a.m.	Traditional Medicine in Kenya: Past and Current Status, Challenges and the Way Forward. Gakuya, D. W.
11.30 a.m.	Discussion
SESSION 12	ANIMAL PRODUCTION
11.40 a.m.	A Review of Pig production in Western Kenya: Current status and future trends in changing Environment. Kanini Mutua, F.
11.50 a.m.	Animal Nutrition: The impact of changing environment. Mbugua, P. N.
12.00 noon	Challenges and Opportunities of Animal Feed Industry in Kenya. Wahome, R. G.
12.20 p.m.	Indigenous Poultry Production: Current Status, Challenges, Opportunities and Future Trends in Changing environment. Kabuage, L.
12.30 p.m.	Discussion
13.00 p.m.	Lunch break

SESSION 13

Chairman **ANIMAL WELFARE**
Dr. Okeyo Mwai

14.00 p.m. Measuring Improvements in Welfare of Working Equines: A Case of Heshimu Punda Programme, Kenya. **Kirui, G.**

14.10 p.m. Animal Welfare: Current Status and the Future Trends in the Changing Environment. **Kimwele, C. N.**

14.20 p.m. Performance evaluation of cattle breeds in the South Western Agro-Ecological Zone (SWAEZ) of Uganda. **Lagu, C.**

14.30 p.m. **Discussion**

SESSION 14 CLOSING CEREMONY

Chairman **Prof. P.K. Gathumbi**

15.00 p.m. Presentation of Awards
Dean, Faculty of Veterinary Medicine
Principal, College of Agriculture and Veterinary Sciences
Vice-Chancellor, University of Nairobi
Guest of Honour – Minister for Fisheries Development

Chairman:

SESSION 15 Prof. S. M. Arimi

POSTER SESSION

1 Rearing Methods do not affect Growth Pattern of the Helmeted Guinea fowl (*Numida meleagris*). **Kimata, M. D.**

2 Retrospective Study on Canine Infertility in Nairobi and Its Environs. **Aleri, J. W.**

3 An economic analysis of the contribution of livestock to household incomes in Migori District, Kenya. **Ayieko P. O.**

4 Characterization of *Babesia Gibsoni* Pyruvate Kinase as a Novel drug Target for Prospective Antibabesia drugs Screenings. **Oluga A. G.**

- 5 An Acute Respiratory Distress Syndrome due to Babesiosis in a dog
Aleri, J. W.
- 6 Prevalence Of Porcine Cysticercosis and Risk Factors for Taenia Solium Cysticercosis/Taeniosis in three Divisions of Homa Bay District, Kenya.
Eshitera, E. E.
- 7 Trypanosomosis Prevalence in Lake Victoria, Meru-Mwea and Lae Bogoria Tsetse Belts of Kenya. **Mwangangi, D. M.**
- 8 Application of Conjoint Experiment to Explore Farmer Preferences for Contagious Bovine Pleuropneumonia Vaccine and Vaccination Attributes in Narok District of Kenya. **Kairu-Wanyoike, S.**
- 9 An Estimation of The Impact of Contagious Bovine Pleuropneumonia and its Control by Vaccination: a Case of Narok District of Kenya. **Kairu-Wanyoike, S.**
- 10 The effect of aqueous, ethanol and chloroform extracts of *Euclea divinorum* (*Ebenaceae*) and *Ricinus communis* (*Euphorbiaceae*) on isolated rabbit uterine strips. **Kaluwa, C.**
- 11 Pathological Changes in Selected Organs of Nile Tilapia and Nile Perch in Lake Victoria, Kenya. **Kamundia, P. W.**
- 12 The Occurrence of Trypanosoma in Fish in Lake Victoria, Kenya. **Kamundia, P. W.**
- 13 Traumatic Diaphragmatic Hernia in 3 Canines, a Challenge to Management. **Kipyegon, A. N.**
- 14 Contamination levels of wastewater, re-used for irrigation, soils and vegetables under the irrigation. **Muneri, C. W.**
- 15 Investigation of Hygiene Standards of Carcasses Slaughtered in five local Slaughterhouses of Somaliland, Somalia. **Wamalwa, K.**
- 16 Early Detection of Hyperglycemia using Glycated Hemoglobin in Mice Model. **Kibebe, H. W.**
- 17 An Outbreak of Sheep and Goat Pox Disease in a Farm in Kiambu West District, Kenya. **Bundi, R. M.**
- 18 Acute toxicity and cytotoxicity of aqueous and chloroformic extracts of *Rapanea melanophloeos*. **Amenya, H. Z.**
- 19 Use of Albendazole-levamisole combination in controlling multiple anthelmintic resistance in a sheep farm in Kabete Kenya. **Nganga, C. J.**
- 20 The epididymis of rufous sengi (*Elephantulus rufescens*): Structure, adaptations and role in sperm maturation and storage. **Kisipan, M. L.**
- 21 Factors Leading to Lack of Confirmation and Under-Reporting of Foot-and-Mouth Disease in The Somali-Ecosystem in Kenya. **Chepkwony, E. C.**

- 22 Performance evaluation of goat breeds in the South Western Agro-Ecological Zone of Uganda. **Lagu, C.**
- 23 The Antibacterial Activity of Some Medicinal Plants used in Meru Central District, Kenya. **Musau, J. K.**
- 24 Bioavailability of Cobalt and anthelmintic effects of Albendazole fortified with Cobalt (Vermitan super) in Sheep. **Nguta, J. M.**
- 25 Spectroscopic Determination of Cobalt and Copper in Grass Pastures in Kabete. **Nguta, J. M.**
- 26 Comparative Profitability of Pork Butcher Businesses in Western Kenya. **Levy, M. A.**
- 27 Kidney Failure Due to Uterine Stump Pyometra in a Five Year Old Female Cross Breed Dog. **Gitonga, P. N.**
- 28 Surface water contamination by livestock in Migori District-a case for one health. **Mbaabu, P. M.**
- 29 Best Practices in Value Chain Promotion: Experience for Kenya Beef Value Chain. **Thaiya, J.**
- 30 Drought preparedness and intervention-the role of a veterinarian. **Njuguna, S.**
- 31 An investigation on the pathogens associated with clinical mastitis in dairy cows managed by the ambulatory services of the Faculty of Veterinary Medicine, Kabete. **Gakuya, D. W**
- 32 Toxic poisoning of pigs encountered naturally in smallholder farms in Nairobi and its environs. **Karanja, D. N.**
- 33 The Niche of Sociology in the Climate Change Debate. **Ongoro, E.B.**
- 34 Seroprevalence of Peste Des Petits Ruminants in Cattle Camel and Selected Wildlife Species in Kenya. **Ithinji, G. D.**
- 35 Common water hyacinth, *Eichhornia crassipes*: An invasive plant species that has wrecked havoc in Lake Victoria. **Kisia, S. M.**
- 36 Study of Mastitis in Camels in North-Eastern Province of Kenya. **Wanjohi, G. M.**
- 37 Influence Of Potato Cultivar, Frying Temperature And Storage Time On Levels Of Peroxides And Free Fatty Acids In Crisps Made From Four Kenyan Potato Cultivars. **Abong', G.O.**
- 38 Nutritional and Antimicrobial Activities of Two Selected Termitomyces Species of Mid-Western Uganda. **Nakalemebe, I.**
- 39 Fisheries Policy and its Relevance to Food Security and Safety. **Ogara, W. O.**

- 40 Functional Genomics of Tsetse/Trypanosome Interactions. **Laila, U. A.**
41. Microarray Technology: A robust High Throughput Method of Investigating Gene Function. **Maina, E. N.**

FACULTY OF VETERINARY MEDICINE

The Faculty of Veterinary Medicine, which was transferred from Makerere University to the then Royal College, Nairobi is the oldest faculty of the University of Nairobi. It was established as a degree-granting faculty on 1st July 1962 with 13 undergraduate students. It is also believed to be the first Faculty in Africa South of Sahara to award B. V. M. degree. The Faculty has grown since then, and it has the following departments:

- 1. Department of Veterinary Anatomy and Physiology**
- 2. Department of Veterinary Pathology, Microbiology and Parasitology**
- 3. Department of Public Health, Pharmacology and Toxicology**
- 4. Department of Animal Production**
- 5. Department of Clinical Studies**
- 6. Department of Biochemistry**
- 7. Faculty Veterinary Farm**

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ORAL PRESENTATIONS

A1 USE OF LESSER BUSH BABY (GALAGO SENEGALENSIS) IN RESEARCH.

Albert W. Nyongesa^{a,*}, Anna Forberg^b, Carl Hallberg^b, Hans-Erik Carlsson^b.

^aDepartment of Veterinary Anatomy and Physiology, University of Nairobi, P.O Box 30197, Nairobi, Kenya, ^bDepartment of Neuroscience, Division of Comparative Medicine, Uppsala University, Uppsala, Sweden.

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This is a retrospective study concerning the use of lesser bush baby (*Galago senegalensis*) and their biological materials in research. We reviewed studies published between 1960 and 2007 in peer-reviewed journals using Medline, Pub-med as well as PrimateLit databases. The number and sub-species of *G. senegalensis* used, their origin, type and nature of study as well as area of research were analyzed. The factors of importance to the outcome of the results were also analyzed and recorded. A total of 234 articles involving 234 studies were identified. The studies were classified as acute (14.5%), chronic (50%), non-invasive (19.7%) and in vitro (15.8%). Of all the invasive studies recorded, 11.4% were categorized as mild, 26.3% as moderate and 59.6% as substantial based on the severity of procedures employed. In the studies that specified the number of animals used (56.9%), 6525 animals were recorded. The remainder constituted 0.8% of the total animals specified. Most commonly used sub-species were *G. senegalensis senegalensis* (57.9%), *G. s. moholi* (36.8%), *G. demidovii* (2.4%) and *G. alleni* (2.1%). The number of animals per experiment was highest

between 1960 and 1964 and decreased over period. Studies conducted between 1975 and 1984 registered a significantly higher ($P < 0.05$) number of laboratory compared to field studies. In these studies, Neuroscience was the outstanding subject area (35.5%) followed by Behavioural sciences (9.8%), Reproductive Biology (6.8%) and Anatomy and Morphology (4.7%). Factors related to the animals, housing and husbandry practices showed ventilation and cage cleaning as the least specified (5.7%) while animal density as the most specified.

Key words: Lesser bush baby, Research, Biomedical, Scientific.

A2 NITRIC OXIDE SYNTHASE 3 GENE TRANSCRIPTIONAL REGULATION IN PULMONARY MYOFIBROBLAST DIFFERENTIATION AND ITS IMPLICATION IN PULMONARY FIBROSIS.

Dominic Ochwang^{i a*}, Charles Kimwele^b, Nancy Rice^c, Stephen G. Kiama^d

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Nitric oxide (NO) produced by endothelial cells via nitric-oxide synthase (eNOS) conversion of L-arginine to L-citrulline represents an antifibrotic mechanism in the body. Studies suggest that nitric oxide (NO)-mediated signals does this role through regulating myofibroblast phenotypes. This work focused on the transcriptional regulation of NOS3 gene at promoter level. Rat and human NOS3 was used to transfect myofibroblast cells, promoter activity was assayed using the Dual Luciferase reporter gene assay technique. The results showed that rat NOS3 promoter was active in the rat pulmonary myofibroblasts with the human NOS3 promoter showing little or no activity.

Determination of the effect of various compounds on promoter activity either as effectors or inhibitors and was carried out. NOS3 promoter activity was then assessed using Dual Luciferase Assay. The results showed that high concentrations of Phorbol-12-myristate-13-acetate (PMA), Calcium and S-nitroso-N-acetylpenicillamine (SNAP), a Nitric Oxide donor, down-regulated the expression of NOS3 gene. Conversely, high concentrations of transforming growth factor beta ($TGF\beta$) up-regulated the expression of NOS3 gene. Calcium suppresses eNOS expression by the effect seen by 23187 (Calcium ionophore) increasing the entry of calcium into the cells. From these results it can be concluded that down-regulation and up-regulation of the NOS3 promoter is therefore transcriptionally regulated. Inhibition of NO production has been seen to increase accumulation of myofibroblasts therefore an enhanced expression of eNOS in response to pharmacological interventions could provide protection against interstitial pulmonary fibrosis (IPF) emanating from altered characteristics of myofibroblasts.

A3 THE MORPHOLOGY OF OLFACTORY MUCOSA AFTER ADMINISTRATION OF VINBLASTINE SULPHATE IN RABBITS.

B. M. Kavoi^{1*}, A. N. Makanya¹, J. Plendl², S. G. Kiama¹

¹ Department of Veterinary Anatomy and Physiology, University of Nairobi, P.O. BOX 30197, Nairobi. Kenya

² Institute of Veterinary Anatomy, Free University of Berlin, Koserstr. 20 14195, Berlin, Germany

Vinblastine sulphate is a cancer chemotherapeutic drug which acts by disrupting microtubule dynamics of highly mitotic tissue cells. The effects of this drug on the nasal olfactory mucosa and its olfactory axon projections to the olfactory bulb have not been studied in the rabbit. In this study, we examined the structure of the conchal olfactory mucosa following administration of adult rabbits with a single intravenous dose of vinblastine sulphate. Three to five days post-exposure, there was disarrangement of the normal layering of nuclei of the epithelia, degeneration of bundle axons, appearance of blood vessels within the bundles, and abnormal enlargement of the cells of the Bowman's glands and apoptosis. This scenario was progressively resolved and no changes were observed after day ten except for increased

mitosis sporadically seen in the basal parts of the epithelia. Our results suggest that vinblastine-induced changes are transient and that the regenerative recovery occurring by day ten leads to restoration of normal structure of the olfactory mucosa.

KEY WORDS: vinblastine sulphate; morphology; olfactory mucosa, rabbits

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A4 TRANSFORMING TO INNOVATIVE AND INVENTIVE RESEARCH IN ANIMAL HEALTH IN EAST AFRICA;NEW VISION: INVENTION PATHWAYS, CHALLENGES AND SOLUTIONS

Gabriel Mbassa¹

Department of Veterinary Anatomy, Faculty of Veterinary Medicine, Sokoine University of Agriculture, P. O. Box 3016 Morogoro Tanzania, gkmbassa@suanet.ac.tz, gabrielLmbassa@yahoo.com

Research outputs in animal health and biomedical sciences in East Africa are narrowed by funding, facilities and equipment. Research done in the past four decades has not entered the stage of development of tangible usable materials; medicines, vaccines, biologicals, farm machinery because of many challenges, which are analyzed in this study. In a new vision strategies and steps to transform to innovative and inventive research to create and manufacture veterinary products are presented. The pathway to innovation is brain power towards scientific thinking to create new products, developing methods and synthesizing the compounds. To neutralize the little funding, facilities and equipment require sustained confidence to succeed in product development, stage to stage testing of intermediate products in biological synthesis processes, cooperation in science and product awards. It is concluded that to develop scientific products African scientists have to confidently perform quality scientific research to produce commercial materials.

Key words

Innovative Contemporary Quality Research, Biological Products

A5 INVESTING IN SCIENCE AND TECHNOLOGY AND INNOVATION FOR SOCIOECONOMIC DEVELOPMENT. Taracha, E.

A6 CHALLENGES TO DAIRY DEVELOPMENT IN RWANDA – THE CASE OF NYAGATARE DISTRICT

Francis M.B. Mbuza and Juvenal Kagarama, Faculty of Veterinary Medicine, Umutara Polytechnic, P.O. Box 57, Nyagatare, Rwanda

Key words: Rwanda, Dairy development, challenges, Trans-boundary diseases, zoonoses, Akagera National Park, Cattle corridor, genocide

The Government of Rwanda has adopted livestock production generally and Dairy development in particular as a major tool for modernizing agriculture for the purpose of poverty eradication (GoR Vision 2020). This has been necessitated by the very low social and economic development indicators that prevailed in the post-genocide Rwanda. Malnutrition, illiteracy, diseases and very low household incomes were the order of the day. Given the small size of the country and the very large human population, policies for intensification of production systems were the obvious choice. In the livestock sector the immediate policy objective was for emphasizing intensive Dairy production. The policy instruments included

substitution of the low yielding Ankole cattle by high yielding exotic dairy genotypes through importation and crossbreeding, improvement of Artificial insemination services; Cattle markets were constructed to stimulate increased off-take of local Ankole cattle to pave way for improved Dairy genotypes; Large water reservoirs (dams and tanks) were constructed to encourage sedentization and shift from transhumance; a large part of Akagera National Park was degazetted to accommodate the former pastoralists; Veterinary schools were started in public institutions of higher learning to graduate high caliber vets and para-vets, and a national policy of one Dairy cow per family was initiated. All these programs were expected to ensure self sufficiency in milk production and acceptable levels of household incomes by the year 2010. This expectation has met with salient challenges:

Nyagatare District is the largest milk shed of Rwanda. The district borders Tanzania and Uganda to a very large extent. The Tanzanian side is occupied by a national park while the Ugandan side is inhabited largely by pastoralists. These two scenarios favour free movement of livestock and wild game across the common borders with the accompanying trans-boundary diseases. Nyagatare District is logically the onset of the famous cattle corridor that runs the long route northwards to the Sudan and Somalia. This forms a recipe for all kinds of epidemic diseases. The existence of national parks and game reserves in the area and the prevalence of many rivers which tribute to the Akagera form good habitats for parasites such as tsetse flies and thus trypanosomiasis may be a problem near the game areas. Under such circumstances, Nyagatare District is a hot spot for trans-boundary diseases including epidemic and zoonotic diseases. This calls for focused research in this area. The socioeconomic challenges include the poor infrastructure for milk production, collection, processing and marketing. The challenges in improving the quality and quantity of feed resources to support the improved genotypes is also formidable. Plans are under way for improving disease surveillance, diagnosis and control and also to address the socioeconomic and animal nutrition challenges.

A7 INFLUENCE OF CHANGING CLIMATE ON OCCURRENCE AND DISTRIBUTION OF EMERGING DISEASES

Njenga Kariuki

A8 LIVESTOCK EMERGENCY GUIDELINES AND STANDARDS – A TOOL FOR LIVESTOCK EMERGENCY RESPONSE

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Climatic trends are causing more frequent and varied humanitarian crisis particularly among livestock keeping communities in developing countries which rely on livestock as a crucial livelihoods asset. Livestock interventions are usually a feature of relief response during human disasters. Despite these responses, the needs of livestock keeping communities are not fully met. Some of the livestock relief projects that have been implemented in the past are inappropriate or are badly implemented. They are characterised by poor analysis, poor stakeholder involvement and late assistance even where disaster is slow onset. These projects have very limited impact assessment and are weakly coordinated with development projects. This has been partly due to lack of clear cut guidelines and standards to assist donors, programme managers and technical experts in the design and implementation of livestock technical interventions during disasters. It is against this background that the Livestock Emergency Guidelines and Standards (LEGS), a set of international standards for improving the quality of livestock programs in humanitarian disasters was developed. LEGS has a global coverage but focuses on regions prone to repeated or large-scale rapid onset, slow onset and complex disasters. LEGS links emergencies to livestock and livelihoods in order to bring a livelihood perspective in livestock based disaster relief, enables humanitarian

actors to design and implement projects which help to protect and/or rebuild livestock assets with the ultimate objective of assisting people affected. LEGS gives an insight on how to conduct rapid assessments of livestock and livelihoods, identify appropriate interventions, common standards, livestock technical standards.

PREPAREDNESS AND EMERGENCY MITIGATION: CURRENT AND FUTURE TRENDS IN CHANGING CLIMATE.

Ondimu, K.

A10 TRANSBOUNDARY ANIMAL DISEASES IN RELATION TO THE CHANGING ENVIRONMENT: CURRENT STATUS AND FUTURE TRENDS

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The Food and Agriculture Organization of the United Nations/ and the World Animal Health Organization define trans-boundary animal diseases as: “Those animal diseases that are of **significant economic, trade and/or food security importance for a considerable number of countries**; which can easily spread to other countries and reach epidemic proportions; and where control/management, including exclusion, requires cooperation between several countries”. Currently in East Africa, some of the diseases that fall into this category are: Foot and mouth disease; Highly pathogenic avian influenza; Newcastle disease; infectious bursal disease; Rabies; Rift valley fever; African swine fever; Rinderpest; Contagious bovine pleuropneumonia; Contagious caprine pleuropneumonia; Peste des petis ruminats; Trypanosomosis; Lumpy skin disease. They are of concern because of the impact they have on the livelihoods, food security and socio-economic activities of the affected communities and countries; the potential of some of them to crossover to infect humans; interruptions to local and international trade as well as functioning of associated industries; and the associated, unpredictable and uncontrollable natural forces of climatic factors like drought, excessive rainfall, wind patterns and disease cycles in natural reservoirs. Interventions have to be regional to be effective and include: early detection and diagnosis; vaccinations, treatments and vector control; limitations of livestock movements; public awareness; development of training curriculums; surveillance. This requires adequate human resources capacity for diagnosis of each disease; an effective and reliable diagnostic test for early detection and diagnosis; appropriate legal and policy framework; appropriate teaching curriculum; funding; and the involvement and cooperation of the regional and international animal and human health organizations. Research questions arise regarding the search for appropriate vaccines; diagnostic tests; risk factors presenting vulnerabilities to the occurrence of a specific disease; disease modeling; herd immunity; reservoirs and climatic changes affecting various aspects of a specific transboundary disease; impacts of the occurrence of a specific disease and genetic variability of the causal agents relative the pathogenicity of the agent and the severity of clinical disease. Although some of the diseases have been eradicated (Rinderpest) while some are in the process of being eradicated (trypanosomosis) it is critical to identify a number of them that can be progressively targeted for eradication. Transboundary animal diseases may lay dormant and re-emerge after several years or be freshly introduced into a country. Therefore the search for reservoirs, the attendant silvertic cycles and disease controls such situations; the type and timing of implantation of control measures in the epidemic; the understanding of the methods of spread and adaptation of the pathogen to the local population and the establishment of an endemic status are major challenges now and in the future. While in the past it was difficult to rapidly detect a disease

agent, now the polymerase chain reaction test provided a rapid process to detect a disease agent. In the future new diseases may arise and hopefully they will be quickly detected. In conclusion transboundary animal diseases have permeating impacts on livestock and society and demand attention from a wide circle of stakeholders.

A11 EMERGING TRENDS OF TUBERCULOSIS IN KENYA: THE HUMAN LIVESTOCK INTERLINKAGE

Arimi, S.M.

A12 FISH DISEASES IN KENYA: CURRENT STATUS AND FUTURE TRENDS IN CHANGING ENVIRONMENT

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Finfish like other animals are prone to infections that limit their growth, reproduction; cause morbidity and mortality; while some are zoonotic. Fish diseases and conditions recorded in Kenya are based on laboratory diagnosis after disease outbreak on farms, research and capture fisheries.

Fish parasites reported include ectoparasitic protozoa, endoparasitic helminthes, and parasitic crustaceans. A few microbial infections have been reported in form of acid-fast bacteria, Gram positive and negative bacteria; surface and systemic fungi. Lymphocystis virus infection is the only one reported so far. Non – infectious disorders in form of mycotoxicosis, nutritional deficiencies, tumours and stunted growth have been reported in various fish.

Fish capture from the ocean, lakes and rivers has a limit, but there is high demand for animal protein to feed the ever increasing human population. This demand can partly be filled by increased production in aquaculture in numerous water resources in the country. The Government of Kenya has identified aquaculture development as a core sector for economic stimulus program and allocated fund to it. As a result farmers are involved in semi-intensive and intensive aquaculture systems. This will provide the highly needed quality protein for domestic use and trade; lead to economic growth, poverty reduction, increased income, and improved food security.

As subsistence and commercial fish farming increase, there will be challenges in form of availability of fish seeds, feeds; and climate change and water pollution. Some of these will cause stress to fish predisposing them to endemic, emerging and re-emerging diseases; make fish products unsafe for both human and animal consumption; and trans-boundary diseases, a concern to the veterinarian. The diseases will also limit accessibility to lucrative markets. This is an overview of current fish disease status and future trends in changing environment challenges for the veterinarian.

A13 BIOAVAILABILITY OF COBALT AND ANTHELMINTIC EFFECTS OF ALBENDAZOLE FORTIFIED WITH COBALT (VERMITAN SUPER) IN SHEEP.

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This experiment evaluated the bioavailability of cobalt and the anthelmintic effects of albendazole fortified with cobalt (Vermitan super^R) in sheep over a period of 28 days. Cobalt chloride was added to provide 0.31ppm to albendazole. Albendazole preparation without cobalt chloride was also used as the positive control. Twenty eight cross bred wether lambs initially weighing 22.8±3.3 kg were randomly allotted to one of the two treatments. Blood samples were collected and live weight gain determined at 7 day intervals and tissue samples collected before the experiment, on day 14 and at experimental termination. Plasma and liver tissues were analyzed for cobalt concentrations. Feecal samples were collected before treatment and on day 14. Feecal egg counts were determined using the McMaster technique. Anthelmintic efficacy of the two albendazole preparations was evaluated using the feecal egg count reduction test.

Lamb bodyweight was not influenced by anthelmintic cobalt concentrations ($P>0.15$). Both plasma and liver cobalt concentrations in the treatment group increased at each collection period ($P<0.01$) and the liver had an anthelmintic cobalt concentration \times time interaction ($P<0.01$). There was a strong positive correlation ($r = 0.92$) between plasma and liver cobalt concentrations. Liver had the highest cobalt concentrations. Both gross and microscopic evaluation of tissues revealed no significant lesions for any treatment groups. All strongyle eggs were cleared by day 14 in both treatment groups. These results suggest that ≤ 0.31 ppm anthelmintic cobalt as chloride will provide plasma cobalt levels of 0.21ppm by the 28th day post administration, but have no advantage over non fortified albendazole in anthelmintic control.

Key words: Cobalt; Albendazole; Sheep; Bioavailability; efficacy

A14 STAMP OUT SLEEPING SICKNESS (SOS): AN INTERSECTORAL APPROACH TO NEGLECTED ZONOTIC DISEASE CONTROL IN UGANDA”

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Uganda is the only country in Africa to harbour both forms of the neglected zoonosis Human African Trypanosomiasis (sleeping sickness). Progression of modern molecular technologies this decade has shown domestic livestock to be the major reservoir for this fatal human infection. Research has also shown the disease to be rapidly spreading in Uganda (eight new districts in as many years); up until recently there was a very real threat of a merger between the two forms, which would have resulted in a public health nightmare.

The Stamp Out Sleeping Sickness (SOS) initiative is a Public Private Partnership (PPP) which facilitates control of human disease through an innovative community-based livestock intervention known as “restricted application technique” (RAP). Combining scientific research with corporate and local commercial interests, SOS has grown into a significant ongoing partnership between the Ugandan government, medics, veterinarians, academia and the private sector, resulting in local business creation and significant institutional and policy change in Uganda. Change of the veterinary curriculum at Uganda’s Makerere University has been an additional positive output of the initiative, with final year veterinary students now receiving practical training in animal handling, diagnostics, disease surveillance and community engagement as part of the ongoing SOS mass cattle treatment programme.

With the intervention now aimed at treating 500 000 cattle over seven districts, the SOS initiative has been successful in halting the spread of human disease. Cutting edge molecular research combined with political goodwill and private sector engagement has resulted in a change of approach from traditional tsetse control or “reactive” treatment of human cases, to a holistic intersectoral “One Health” approach for the sustained control of this fatal human disease in Uganda.

A15 AFLATOXIN IN ANIMAL FEEDS AND HUMAN FOOD IN CHANGING ENVIRONMENTS

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Aflatoxins are a group of mycotoxins produced by *Aspergillus* species (fungi) under favorable conditions of temperature and humidity. Of late, aflatoxicosis has become important in Kenya because of its morbidity and mortality.

This paper will address the contamination of animal feed and human food sources with aflatoxins, knowledge and practices that predispose feeds and food sources to contamination and the effects of climate change will have on future outbreaks of aflatoxin poisoning in Kenya, and, mitigation strategies to control the problem.

A16 ANIMAL PRODUCTS QUALITY CONTROL AND VETERINARY SERVICES IN A DEVOLVED GOVERNMENT

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Veterinary Services is one of the standardized structures in the World Organization for Animal Health (OIE) system and, by extension, in the World Trade Organization. It is recognized that the “Competence” and “Organization Structure” of the Veterinary Services in general and the Veterinary Authority in particular is critical to assuring consumers and importing countries on the quality and safety of animal products. The evaluation of veterinary services is indeed the first step in risk assessment for international trade, with countries having compliant veterinary governance easily accessing markets and non-compliant ones encountering obstacles in the matter.

Veterinary Services may be governed through either a centralized structure or a devolved structure or a mixture of both. However, either of the two structures would be adjudged compliant if it demonstrates all of the following baselines:

- A Chief Veterinary Officer who is able to apply effective control over animal health and zoonoses matters and international veterinary certification in the whole territory of the country.
- A Veterinary Authority in the central government which is responsible for the observance of international sanitary obligations by regional, county or non-governmental entities in its territory.
- Strength in terms expertise, competence and resources capacity;
- A coordination mechanism with clear chain of command that can be implemented as necessary to address all activities throughout the country.

The New Constitution of Kenya provides for devolution of government services between national and county levels. Historically in Kenya, Veterinary Services has been governed under a centralized system with field offices in all units of public administration and with a direct chain of command across the country and which has been responsible for animal product quality control services. The new Veterinary Services would be administered by counties with the national government retaining the role of formulating policy. These provisions are new and therefore Veterinary Services will need to be restructured to fit into the emerging order of national governance.

The constitution does not provide details of how national and county levels of Veterinary Services, including animal products quality control, would perform to achieve effectiveness. These details would be provided by legislation as well as by general government administration. Nevertheless there are several sections of the constitution whose appropriate interpretation would provide opportunity to restructure and create internationally compliant veterinary governance.

This Paper will provide highlights on devolved veterinary structures and make suggestions on how Kenya's Veterinary Services may be restructures to conform with both the new constitution as well as international standards.

A17 FISH FARMING, AQUATIC AND MARINE

Macharia, S.

A18 INTERLINK BETWEEN THE CHANGING CLIMATE, LIVESTOCK RESOURCES AND FOOD SECURITY.

Director, KARI

A19 FOOD SAFETY AND FOOD SECURITY LINKAGE: A FOCUS ON LIVESTOCK PRODUCTS

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Food safety is of high priority nationally and internationally. It implies absence or acceptable and safe levels of contaminants (chemical, physical and biological) in food, adulterants, naturally occurring toxins or any other substance that may make food injurious to health or an acute or chronic basis. The prevailing food production, handling, processing and distribution systems determine the safety of food. This paper explores the linkage between food safety and food security with a focus on livestock products. It looks at food security at the individual, household, national, regional and global levels and is based on the premise that it is achieved when all people, at all times, have physical, economic and social access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

A20 IMPACTS OF CLIMATE CHANGE ON HUMAN WILDLIFE CONFLICT IN EASTERN AFRICA

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Climate change is a phenomenon that is already happening and in some areas of Africa it is taking place at an alarming rate. Climate change is expected to cause an increase in

weather-related disasters and extreme weather events, such as droughts, heat waves, floods, desertification, and increases in vector-borne infestations. Long-term changes in climate exacerbate environmental degradation which will lead to the existing loss of wildlife habitat in many vulnerable places. Furthermore, climate change will alter the location and nature of the geographical environment, and wildlife will be forced to migrate to new areas as a way of adapting. As there are limited natural places left for wildlife to move to, this will likely bring wildlife into more densely populated human areas, and create situations of human wildlife conflict. This review will be looking at how climate change related hazards and their related disasters could make human wildlife conflicts inevitable.

A21 PEOPLE, LIVESTOCK, AND WILDLIFE: EXISTING BEST NATURAL RESOURCE MANAGEMENT PRACTICES IN NAIBUNG'A AND NAMUNYAK COMMUNITY BASED CONSERVANCIES.

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There are a number of successful Community Based Conservation (CBC) projects in Ewaso Nyiro ecosystem. The success of CBC depends upon its acceptance by rural peoples, but few studies have examined the factors behind the adoption of CBC as tool for economic diversification option by pastoralist.

This paper explores the drivers behind the success of CBC as an alternative sustainable option in pastoral livelihood diversification in Kijabe, Il-polei Tiemamut and Koiya and Namunyak group ranches of Naibung'a and Namunyak conservancies respectively.

Using participatory methodologies, the study used both qualitative and quantitative methods. The key methodologies used included; maps and photos, transects walks, personal interview with key informants (20), semi-structured questionnaires (108 households), focused group discussion (10), semi-structured interviews (20), maps and photos.

Community participatory approaches to wildlife conservation have significant influence on the successful natural resource management of Naibung'a and Namunyak community conservancies ($F= 10.751$, $d.f= 32, 77$, $p= < 0.000$). There is also high positive correlation between these variables and (CBC) success ($r^2= 0.817$, $n=108$ households). Similarly, conservation friendly culture and ecotourism have significant influence on change of attitudes towards game meat and general acceptance of wildlife as alternative source of income ($F= 9.831$, $d.f= 32, 77$, $p< 0.000$),.

In nutshell, strong and equitable community institutions, secure resource rights, active community participation and benefit sharing partnerships are key governance attributes for successful and sustainable community-based conservation.

A22 WILDLIFE-LIVESTOCK INTERFACE IN A CHANGING ENVIROMENT Muchemi, G.M.

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Wildlife-livestock interface defines the interaction between free ranging wildlife and livestock and livestock husbandry practices. This occurs as a result of belonging to the same or bordering ecosystems or sharing of resources. In the past the interface was largely transient such as pastoralist livestock passing through the wildlife concentration areas in search of pasture and water, but now the livestock and wildlife utilize the same resources in common

grounds. This has led to wildlife and livestock sharing grazing pastures, common watering points, interacting along fences, sharing boundaries with wildlife protected areas. Climatic and environmental changes which include drought, flooding, variation in climatic elements such as, temperature, humidity, wind speed and direction over the years have led to seasonal and annual fluctuations in wildlife and livestock movements. As a result, this has led to habitat changes and environmental degradation. With increased human population in a fixed land mass and inherent changes in land use and land tenure, crop farmers and pastoralists have now invaded areas that were formerly wildlife range. This intensified interaction between human, livestock and wildlife has led to human wildlife conflicts and competition between wildlife and livestock for resources such as pastures, grazing range and watering points. There is also increased sharing of diseases and parasite vectors between wildlife and livestock. There is also manifestation of sociocultural changes such as sedentization of pastoral communities which impact on the interface. Coping strategies for these environmental and climatic changes have included pastoral livestock movement through protected areas exposing livestock to predation and diseases as well as moving livestock to areas unsuitable for their health and production. Development of adaptable policies on livestock and wildlife management, and sustainable natural resource management strategies are necessary to address these challenges. Approaches could include ecotourism and community based wildlife sanctuaries such as Ilngwesi and Naibunga conservancies in Laikipia and Namunyak in Samburu.

Key Words: Wildlife, Livestock, Interface, Changes.

A23 BEEKEEPING; CURRENT STATUS AND FUTURE TRENDS IN CHANGING ENVIRONMENT

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The development of Beekeeping in Kenya has become a very important component of the livestock sub sector, particularly in the arid and semi-arid areas of the country (80% of land area) where crop agriculture is not effectively sustained. The country has honey production potential of 100,000MT annually. It is estimated that there are 1.3m traditional hives with an annual production of 5-10 Kg, over 145, 000 Kenya top bar hives with an annual production of between 20-30 and more than 81,784 Langstroth hives with one shallow super which produces an average of 25 Kg a year

The actual production is carried out at the rural house holds as part time income generating activity. The production methods used depend on type of hives used. A large share of production is characterized by low productivity and low quality. The institutional support infrastructure for promoting honey production as an economic activity and provision of technical and financial services is inadequate and not well structured. The collection, processing and marketing of honey is extremely fragmented. Small businesses, co operatives, self help groups, including women entrepreneurs are involved in commercial processing and marketing of honey. Marketing is done in a sporadic fashion, with different producers and processors selling their products in different ways. Niche markets for Kenyan honey have not been fully developed.

The government policy is to enhance the contribution of the beekeeping sector to food security, employment creation and environmental conservation in the country, through increased production and supply of honey and other hive products to meet local demand and have surplus for export. Promotion of value addition at all stages of beekeeping value chain and improve marketing of hive products for an internationally competitive market. Also ensure

existence and safety of honeybees, assure quality of hive products and promote environmental conservation

The industry experiences several challenges key among them lack of formal policy and legal frame work, limited technical knowledge, weak institutional support and poor infrastructure, inadequate of market in formation and organization.

However, there are opportunities such as, natural forests, honeybee plants large domestic and international market, honeybees, and political will.

A24 THE POTENTIAL OF STINGLESS BEES AS AN EMERGING LIVESTOCK

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Stingless bees are becoming important alternative pollinators to the honeybee, previously considered a universal pollinator, due to their abundance and adaptability, besides behavioural traits, which further enhance their suitability.

Honeybees have emerged over the years, with great economic returns. The challenge, however, is the defense mechanism, the sting. This has created negative reactions to the art of bee-keeping. Stingless bees do not sting humans or animals, making them easily acceptable to the bee farmer. They can be managed easily on pollen substitute and honey.

In Africa, stingless bees have been kept for medicine to alleviate various ailments and discomforts such as constipation. The traditional way of excavating them pre-disposes the ground to degradation agents, hence an environmental threat. It is a well demonstrated fact that stingless bee domestication and conservation would significantly impact on food security, besides increased household income.

A25 FISH PRODUCTION IN KENYA – OPPORTUNITES, CHALLENGES AND WAY FORWARD?

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Kenya has 13,600 square kilometers of inland lakes and 640 km of coastline. Ninety five percent of the fish landings are from fresh water lakes, 3% from marine sources, and 1 % from aquaculture. Ninety two percent of fish landings from inland lakes are from Lake Victoria, while 6% comes from Lake Turkana. Other lakes and Rivers contribute 2%. The main species in the wild catch from fresh water lakes include Lates niloticus (Nile perch), Rastrineobola argentea (Omena), Oreochromis niloticus (Nile tilapia), Cyprinus carpio (Common carp) and Micropterus salmoides (black bass).

Until the discovery of the Nile perch as an export commodity in the early 1990's, fishing in Kenya was a subsistence occupation for lake and coastal communities. Currently, capture fisheries earn fishermen approximately Ksh 7 billion, while fish exports earn the country about Ksh five (5) billion in foreign exchange annually. Lake Victoria fisheries have recently been a subject of study by many researchers. Nile perch was deliberately introduced into the Lake in the late 1950's and the ecology of the Lake has never been the same. As catches of Nile perch increased, smaller species such as the haplocromines which were previously dominant disappeared from landings. Lake Victoria is experiencing a myriad of challenges. The water quality has declined due eutrophication arising from inflow of nutrients into the lake, massive blooms of algae have developed causing hypoxia in the deep waters of the lake, overfishing and oxygen depletion threaten artisanal fisheries and biodiversity.

Kenya marine waters have not been sufficiently exploited, mainly due to lack of technology. Marine fish of commercial value include finfish, both pelagic (king fish, barracuda, mullets) and demersal (rabbit fish, snapper, rock cod, scavenger, etc.), crustaceans (prawns, lobsters, crabs, etc.), and molluscs (squids and octopus). These are commercially exploited and support the economy and livelihoods of the coastal residents. Fishing by local fishers is

restricted to inshore areas within the reef ecosystem because they lack vessels to venture offshore to exploit other resources in the EEZ.

Fish farming in Kenya is fairly recent, dating back to 1910 when European settlers imported trout, black bass and common carp and stocked them in various rivers and lakes for sport fishing. Currently, aquaculture is practiced as part of other farming activities and production is low and erratic.

There are many challenges facing inland lakes, particularly Lake Victoria which has been the backbone of Kenya's fish industry. Lake Turkana has also experienced a downward trend in capture fisheries since 1976, due to over-fishing. Marine fisheries are under-exploited and production from aquaculture is low.

Despite the challenges above, opportunities for increased fish production through improved production systems, increased investment in processing, value addition, efficient distribution systems and expanded market access to regional and international markets.

A26 EMERGING LIVESTOCK: CURRENT STATUS AND GLOBAL PERSPECTIVES WITH A LOCAL FOCUS

EMERGING LIVESTOCK: CURRENT STATUS, GLOBAL PERSPECTIVE WITH A LOCAL FOCUS. GATHUMBI P.K.

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Livestock production in Kenya has largely focused on conventional domestic animals, largely ignoring the existing potential of emerging livestock species as sources of protein and other animal products. Emerging livestock including ostriches, crocodiles, quails, guinea fowls, snakes, ants, snails, frogs and chameleons, bees among others are largely unexploited either due to inadequate information to support their production, lack of sufficient market channels, inadequate policy and legal framework or socio-cultural beliefs that preclude their utilization. This paper will focus on the potential opportunities and constraints in production of the main emerging livestock in Kenya including ostriches, crocodiles and quails among others. The existing information on production and marketing of the major emerging livestock will be collated and compared with that from other regions. The current production practices and the main diseases of major emerging livestock will be highlighted. The existing policy and regulatory framework that supports production of emerging livestock in Kenya will be stated. The existing research gaps and opportunities for improved marketing will be discussed. The paper will highlight the existing potential of emerging livestock production to support livelihood, employment and wealth creation in Kenya.

A27 PREVALENCE OF CAPRINE ARTHRITIS - ENCEPHALITIS IN IMPORTED DAIRY GOAT ESTABLISHMENTS IN TANZANIA

Arsen, R.M.

A serological survey for antibodies against caprine arthritis-encephalitis virus (CAEV) in dairy goats and their offspring imported from Norway was carried out in dairy flocks located in Morogoro and Manyara regions of Tanzania. A total of 352 blood samples were collected and sent to a laboratory in Norway, where they were analysed for CAEV antibodies using an indirect ELISA technique. Only two animals (i.e., 0.6 %) were positive whereas 12 goats (i.e., 3.4 %) showed non-specific reactions. The two positive animals were traced back and culled whereas the non-specific cases were isolated for retesting. Despite a significant prevalence of CAEV in Norwegian goat herds, the flocks involved in this study were virtually free from CAEV. In a move to establish specific disease-free flocks in Tanzania, plans are underway to screen other flocks of imported dairy goat breeds for CAEV and other diseases of economic and public

A28 MAJOR CAUSES OF CALF MORTALITY IN PERI-URBAN AREA OF NAIROBI, KENYA

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The study reported data from 507 post-mortem records in the Department of Pathology, Microbiology and Parasitology, Faculty of Veterinary Medicine, University of Nairobi, Kenya. The records were from carcasses obtained from the area around Nairobi during a 20-year period between 1990 and 2009. Approximately 80% (393/507) of the calf carcasses had their diagnosis made through post-mortem examination while the rest, (114/507) were inconclusive. Just less than half (48.3%) of the calf carcasses presented had their age specified by the owners compared to 51.7% whose age was not specified. For calf carcasses whose age was specified by the owners, those indicated as more than three months were one-and-a-half times as many as those below three months old. The proportion of female carcasses (53.8%, 273/507) presented for post-mortem were slightly higher than the male carcasses (46.2%, 234/507). Diseases or conditions of the respiratory system were the most common 17.7% (97/507) while gastrointestinal tract (GIT) was second and affected 16.1% (88/507) of the cases. Another small number, 3.3% (18/507), died from bloat giving the total cases associated with GIT as 19.4% (106/507). Severe calf malnutrition and septicaemia were the third most reported causes of calf mortality in similar proportions at 14.3% (78/507) and 14.4% (79/507), respectively. Other minor causes of calf mortality were tick-borne diseases 8.6% (47/507), helminthiasis and poisoning, 2.9% (16/507) and 1.8% (10/507), respectively.

Keywords: Cause, Calf mortality, Peri-Urban, Nairobi, Kenya

A29 MYCOBACTERIUM AVIUM SUBSP. PARATUBERCULOSIS DETECTION IN SAUDI CAMEL HERDS USING ZEHL-NELSEEN, ELISA AND PCR DIAGNOSTIC METHODS.

Mufareej, S. I. A. A.

A31 PREGNANCY RATES OF BOS INDICUS CATTLE IN MASAI PASTORAL ENVIRONMENTS UNDER AI AND SYNCHRONIZATION BY GnRH AND PROSTAGLANDIN F_{2α}

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200 *Bos indicus* herds of the Tanzania short horn zebu with minimum body condition were studied to determine the efficacy of GnRH + PGF2 alpha combinations for induction of oestrus and/or ovulation on pregnancy rate during the months of the year when temperatures are great (dry season) and during the wet rain season. On day 1 (start of treatment), cows were assigned randomly to either treatment or control groups. Treated cows (n = 50) received i.m. 200microg of GnRH on day 1 and 500microg of PGF2alpha 7 days later (Day 7). Ovsynch (n = 50), 200microg of GnRH at 48 h after PGF2alpha (Day 9) upon detection of oestrus. Detection of oestrus was performed daily during the early morning and evening hours from Days 1 to 21 in all the cows. Palpation per rectum was used on Day 60 to confirm pregnancy and absence of no signs of oestrus. Pregnancy rate was 58% for group 1, 60% for group 2 and 58.5% for group 3 and 4. It is concluded that oestrus detection is the determinant factor for successful pregnancy.

A32 FERTILITY CONTROL: THE MALE PERSPECTIVE

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Fertility regulation or contraception is a means of ensuring that individuals only give birth when necessary. It is an important instrument in controlling, not only the growth of human population, but also managing the feral pest population. To date, a number of approaches have been advanced with varying degrees of success. Regardless of the approach, the contraceptive method should be safe, acceptable and efficacious. The most frequently practised approach in males, often with reliable results, is vasectomy or surgical occlusion of vas deferens. It is highly efficacious; the success level sometimes reaching up to 97%, especially using the non-scalpel method. Hormonal approach, where either large doses of single exogenous androgens or a combination of androgens and progestins are administered, has also become an important tool in male contraception. Androgens suppress spermatogenesis through feedback inhibition of pituitary follicle stimulating hormone (FSH) and, in this regard, a hormonal combination has been shown to be more efficacious than single doses. Immunocontraception, another method based on the development of vaccines using unique antigenic determinants on the surface of spermatozoa, offers a morally acceptable, ethically appealing and user friendly approach towards fertility regulation. This method has, over the years, undergone intense investigation to identify candidate antigens for male fertility regulation and considerable advances have been made towards this end. Lastly, wide arrays of chemical agents have also been tested for their contraceptive value in male candidates but with very little success, perhaps due to their side effects. This review therefore examines all these methods and brings into focus the level of advancement in the quest for an effective contraceptive agent using any of these approaches.

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A33 ADVERSE EFFECTS OF INDOOR CONFINEMENT ON REPRODUCTIVE PERFORMANCE AND HORMONE LEVELS IN THE HELMETED GUINEA FOWL (*Numida meleagris*)

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Breeding cycles and plasma concentrations of reproductive hormones were studied for sixteen months in helmeted guinea fowl kept in two types of housing management; an open-air system (OAS) and an indoor deep litter system (DLS). The birds were fed on local conventional poultry feeds. Three egg laying cycles were observed in rainy months in the OAS with mean clutch sizes of 2.6, 14 and 26 eggs per female. Mean laying rate was 16.2, 24 and 36.1%. Mating was observed in the second and third cycles. Guinea hens in the OAS had high estradiol (E2), progesterone (P4) and luteinizing hormone (LH) and low testosterone (T) levels during the laying cycles. The opposite was the case in the non-laying status found in dry months. Those in the DLS had low E2, P4 and LH as well as high T throughout the study alongside being in the non-reproductive status. Males in the OAS had low T and LH during the mating periods that occurred in rainy months. The opposite was evident in dry months. T remained high throughout while LH had an erratic pattern in the DLS. High T in both systems coincided with numerous courtship displays. An analysis of reproductive organ weight revealed that breeding status was associated with heavier gonads and oviducts. This study strongly indicates that indoor confinement adversely affects reproductive performance and breeding cycles in the helmeted guinea fowl as opposed to open air rearing.

Key words:

Helmeted Guinea Fowl, *Numida meleagris*, Husbandry, Reproductive Hormones, Egg Laying, Breeding.

A34 EXAMINING THE LINKAGES BETWEEN DRAUGHT ANIMAL WELFARE AND HUMAN LIVELIHOODS: EXAMPLES OF SUCCESSFUL COMMUNITY BASED INTERVENTIONS IN KENYA”

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Globally, there is a large amount of evidence to highlight the central role draught animal power plays in securing human livelihoods in many developing countries. In Kenya, donkeys provide valuable draught power to many parts of the country, however despite their important societal contribution, are often under-represented in terms of veterinary services and national animal welfare dialogue. KSPCA, with funding from the Donkey Sanctuary, uses a community development approach to sustainably improve the health and welfare of Kenyan donkeys, which in turn improves human livelihoods: a fine example of “One Health” in action.

In Kenya, the majority of donkey welfare issues occur in the urban and peri-urban areas where donkeys are used by youths for merchandise transport. Society sees these youth as non-achievers using “low status” animals for employment; the result is low user self esteem, indifference towards society, and low empathy towards their donkeys. Alcohol and drug abuse helps individuals cope with the socio-economic pressures faced, resulting in misuse of earnings which pushes them further below the poverty line. In order to improve welfare of donkeys in the areas with worst welfare problems, approaches have to be relevant to the livelihoods of the donkey users and the environment where both people and animals live; thus community participation forms the basis of our approach in Kenya.

Community development approaches in many areas of Kenya have helped donkey users realise the contribution donkey’s make to their livelihoods. Once their self confidence and determination are promoted, so does their willingness to improve their animals’ veterinary attention and general welfare. Improvements in animal welfare lead to even more improved animal outputs, resulting in diversification of employment and further increases in self esteem. Even though community development does not solve all the problems facing donkeys and the community, it does give the communities the ability and confidence to start to solve their own problems.

A35 WILLINGNESS TO PAY FOR CONTAGIOUS BOVINE PLEUROPNEUMONIA VACCINE AND VACCINATION IN NAROK DISTRICT OF KENYA: AN APPLICATION OF CONJOINT ANALYSIS CONTINGENT VALUATION METHOD (CJA-CVM)

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Contagious Bovine Pleuropneumonia (CBPP) is viewed as a public good disease but there is increasing doubt as to the continued public support for CBPP vaccination because of increasing fiscal deficits. A Conjoint Analysis Contingent Valuation Method (CJA-CVM) was used on 208 households in Narok District between October and November 2006. This was to measure individual and mean willingness to pay (WTP), demand for the vaccine and vaccination and factors affecting WTP as well as carry out a social benefit cost analysis (SBCA) using aggregated WTP as benefits and the calculated cost of vaccination. From coefficient estimates obtained from the overall ordered probit regression model (OPM), mean WTP was calculated at KSh. 212.48 (95% CI: -17.52, 442.48). The proportion of farmers

willing to pay a positive amount was 66.7%. Demand curves drawn from individual WTP estimated from individual OPMs demonstrated that only 59% and 50% of cattle owners are willing to pay a benchmark cost of KSh 34.60 for the preferred and current vaccine respectively. A backward fitting Ordinary Least Squares (OLS) regression model, established that WTP was negatively influenced by the attitude about household economic situation ($p=0.0078$), presence of cross breeds in the herd ($p<0.0001$) and years ago CBPP had been experienced in the herd ($p=0.0375$). It was positively influenced by education ($p=0.0251$) and treatment against CBPP ($p=0.0432$). The social benefit cost ratio (SBCR) was 2.9-6.1. The conclusion is that a segment of farmers was willing to pay for CBPP vaccination. However, participation levels were lower than the desired $\geq 80\%$ coverage. Households with certain household demographics that influence WTP negatively need to be persuaded to participate in CBPP vaccination. A Social Benefit Cost Analysis using aggregate WTP as benefits can be used as an alternative method to the traditional Benefit Cost Analysis that uses avoided biological production losses as benefits.

Keywords: Contagious Bovine Pleuropneumonia Conjoint analysis-Contingent Valuation, Willingness to Pay, Vaccine, Vaccination, Narok, Kenya.

A37 BIOTECHNOLOGY AND ANIMAL HEALTH: WHICH WAY FORWARD FOR KENYA?

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Biotechnology has become increasingly important for improving animal health worldwide. However, in Kenya, the application of this technology in animal health is not as established as in the field of crop science. Therefore, the objective of this presentation is to highlight some of the biotechnology tools that have been used in animal health for the developments of diagnostic biologicals, vaccines and drugs, worldwide. The recombinant DNA strategy, which is biotechnology tool for development of diagnostic kits, vaccines and drugs, is highlighted. Specific examples of available commercial diagnostic kits, vaccines and drugs produced by the recombinant DNA technology are presented. The potential role of this technology in improving animal health in Kenya is described. Additionally, we present the role of Director of Veterinary Services in regulating the use of these genetically modified biological products in Kenya, based on the Kenya biosafety act 2009. Finally, we propose the way forward for strengthening regulation of genetically modified organism for use in animal health research and veterinary medicine in Kenya.

Key words: Biotechnology, Animal Health, Kenya

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A38 MOLECULAR CHARACTERIZATION TO IDENTIFY THE GENOTYPIC DIVERSITY WITHIN THE INFECTION AND TREATMENT METHOD (ITM) VACCINE FOR EAST COAST FEVER USING MICRO- AND MINISATELLITE MARKERS

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East Coast fever (ECF) is a fatal bovine disease caused by a tick-transmitted protozoan parasite *Theileria parva*. The disease causes high levels of mortality in cattle and results in vast economic losses. The Infection and Treatment Method (ITM) vaccine has been deployed in eastern, central and southern Africa to protect cattle against ECF. The International Livestock Research Institute (ILRI) with the support of the Food and Agriculture Organization (FAO) of the United Nations produced this vaccine stabilate in 1996. This vaccine stabilate named FAO 1 is trivalent containing three live *Theileria parva* stock components namely, Muguga, Serengeti-transformed and Kiambu 5. It is thought that due to sexual recombination in the ticks during cattle-tick passage, there may be a modification in the genotypic composition of the three stock components. This study evaluated the composition of the FAO 1 reference stabilates by generating *T. parva* clones under in vitro conditions and genotyping the clones using a set of five polymorphic mini- and microsatellite markers. Results showed that the FAO 1 vaccine stabilate contains at least nine genotypes. The Muguga reference stabilate was shown to contain eight *T. parva* genotypes of which two of the genotypes were also in the Serengeti-transformed reference stabilate. Kiambu 5 was genotypically homogeneous with only a single genotype identified. The various genotypes identified in the stabilate do not address how functionally relevant they may be in mediating a broad protection. Current studies are under way to address whether or not the observed genotypic diversity affects the antigenic epitopes.

A39 COLLECTION, SEROTYPING AND CHARACTERIZATION OF FOOT-AND-MOUTH DISEASE VIRUS in circulation in the Somali-ecosystem in Kenya

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Foot-and-Mouth disease (FMD) is an endemic disease in Kenya with five of the seven serotypes of the Foot-and-mouth disease virus (FMDV) causing outbreaks in different regions of Kenya namely O, A, C, SAT 1 and SAT 2. Serotype O and A have been encountered in Somali Ecosystem (SES) in the past¹ but current epidemiological maps on the disease have no indication of the occurrence of the disease in the area. The main objective of this study was to determine the circulating FMDV serotypes and strains in the SES in Kenya, to characterize the strains isolated and relate them to other strains from other areas in order to determine the pools of virus they belong to.

Virus circulation in cattle population was recognized by suspected outbreaks with subsequent sampling, virus detection and/or isolation. In apparently healthy herds oro-pharyngeal fluids were collected and virus detection and isolation tests to determine carrier status and serotypes of the virus.

Serotype O was isolated in the samples collected from clinical cases and sent to World Reference Laboratory, Pirbright for confirmatory diagnosis and sequencing to characterize the strain. Results obtained showed that it is closely related to the vaccine strain K'O'77/78 produced locally in the country by Kenya Veterinary Vaccines Production Institute (KEVEVAPI). Vaccination with this strain would likely protect the animals in the region from more outbreaks caused by this serotype O strain though further tests on vaccine matching need to be done to confirm this. The phylogenetic mapping² places this O strain of FMDV in the East African topotype 1. Five point five percent (5.5%) of the animals sampled for oro-pharyngeal fluid were found to be carriers of the serotype O FMDV.

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A40 SCREENING AND IDENTIFICATION OF POTENTIAL PROBIOTIC BACTERIA FOR USE AS BIOLOGICAL CONTROL AGENTS IN AQUACULTURE IN UGANDA

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With increasing efforts to promote commercial aquaculture in Uganda, disease outbreaks are progressively being recognised as a significant constraint on fish production and trade. The prophylactic application of antibiotics is expensive and detrimental, i.e. promotes development drug-resistant or more virulent bacteria; and may result in unacceptable levels of drug residues in the products. Probiotics, which are micro-organisms or their products with health benefit to the host, have found use in aquaculture as a means of disease control, supplementing or even in some cases replacing the use of antimicrobial compounds. Probiotic bacteria were isolated from the guts of healthy catfish obtained from Aquaculture Research and Development Centre, Kajjansi; and were pre-selected basing on their growth-inhibitory activity on fish pathogens by replica plating. Pathogenic bacteria were isolated from diseased fish that were collected from various farms around Kampala, mainly in Wakiso district. Probiotics were further selected basing on the number and range of pathogens inhibited. The pathogens and probiotics were characterised or identified phenotypically by cell morphology and API 50CH. Probiotics were further identified by 16S gene sequencing. The selected probiotics were analysed for their growth rate in fish intestinal mucus, mode of antibacterial activity, possible beneficial and pathogenic effects to fish and on fish growth rate. Six strains designated P1, P4, P6, P12 and P20, inhibited at least two pathogen types. By genotypic identification; all except P20 belonged to Genus *Bacillus*, while the latter belonged to Family Enterobacteriaceae. Several reports of *Bacillus* spp with probiotic activity exist and besides they have not been reported to be pathogenic to fish. Preliminary characterisation by the criteria for selection of probiotics revealed that these organisms could be of potential use. However, there is need to characterise the isolates intensively for their safety, functional and technological properties before application on farms as biological control of diseases.

A41 VETERINARY EDUCATION AND TRAINING: REMAINING RELEVANT IN CHANGING DEMANDS FOR VETERINARY SERVICE DELIVERY.

Prof Njenga Munene J, Dean Faculty of Veterinary Medicine University of Nairobi

Veterinary training at Kabete started in 1942, leading to diploma in animal health. The graduates worked strictly as veterinary scouts under white veterinary surgeons. However demand for training increased and in July 1962 a Bachelor of Veterinary Science degree programme was started under the University of East Africa. In 1972 the degree was changed to Bachelor of Veterinary Medicine and it remained as the only bachelor degree program until 1999 when Bachelor degree in Biomedical Laboratory Technology was launched and later in 2001 Bachelor in Wildlife Management was introduced. Later a diploma program in Animal Health and Production, Certificate courses in Disease Surveillance and Epidemiology and in Artificial Insemination and Fertility Management were introduced. Nationally the expansion of training needs led to opening of animal health and industry institutes (AHITs), first at Kabete, then Ndomba and Nyahururu. The need to have personnel competent to deal with dairy led to start of the dairy training institute in Naivasha and the need for meat inspectors led to start of Meat Training Institute. The expanded space for training has seen growth of training in private and public institutions in veterinary sciences. Training has mainly targeted increased production and improved health of livestock as well as value addition and public health. Globally veterinary services have been recognized as public good. Kenya being signatory to World Health Organisation of Animals (OIE), World Trade Organisation-Sanitary Phytosanitary Sanitary

(WTO-SPS), CODEX obligations demands that other than traditional training we interrogate whether our training is conforming to international standards in order to make our graduates and livestock products competitive in a "liberalized" global market.

This paper describes the transformation of veterinary training in University of Nairobi from the 1940s to the current and suggests changes that need to be done in order to remain relevant.

A42 ETHNOVETERINARY MEDICINE: THE PROSPECTS OF INTEGRATING MEDICINAL PLANTS PRODUCTS IN VETERINARY MEDICINE IN KENYA

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Animal diseases are a major constraint to livestock production, drought animal power and the acceptability of companion animals. These diseases also impact negatively to the food security in our country. The use of synthetic drugs for disease management is always a challenge because of the unavailability of these drugs especially in rural areas, shortage of foreign exchange to import them, lack of finance to purchase them, drug resistance, misuse due to paucity of knowledge and environmental pollution. Medicinal plants products are part of the natural products that have been in use in traditional medicine and some have been a source of novel drugs. The World Health Organization estimates that 80% of the world's population depend on plants for the primary health care. The use, search and marketing of herbal drugs and dietary supplements have accelerated in recent years and the international herbal markets is currently US\$ 60 billion per annum. Therefore, the use of medicinal plants products would be a rational alternative to the synthetic drugs. Ethnobotanical surveys carried out in many parts of the Kenya have revealed a lot plants being used in animal disease management. Specific plant extracts have been identified and screened by many researchers for their antimicrobial, anthelmintic, acaricidal, antiprotozoal activity and also their toxicity. There is therefore the need to look for ways on how these plants products will be available in the market and be integrated in the overall veterinary medicine practice in Kenya.

A43 MEDICINAL PLANTS USED BY TRADITIONAL BIRTH ATTENDANTS FOR THE MANAGEMENT OF PRE, INTRA AND POST PARTUM COMPLICATIONS IN MACHAKOS DISTRICT, KENYA.

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Despite the dramatic rise in herbal medicine consumption in both developed and developing countries, few studies have been done to document their potential benefits during and after pregnancy and the long term adverse effects to both mother and fetus. In Machakos district the doctor: patient ratio which stands at 1: 62, 325, inadequate number of health facilities and lack of adequate skills amongst reproductive health staff contribute towards more mothers delivering at home.

The objectives of the study were to document pre and post pregnancy complications and identify medicinal plants used for their management. A cross sectional study of all willing and practising TBA residing in Kangundo and Kyevaluki sub locations was carried out. A

questionnaire was used to collect data on pregnancy and post partum complications, herbal remedies, plant part, and route of administration and dose levels. Fifty three plant species belonging to 32 families were identified. Plant species belonging to Compositae family were most commonly mentioned followed by Euphorbiaceae, Labiatae and Rutaceae. 14 plant species were considered morpho as they lacked identification characters and were difficult to find during the field excursions because of their rarity. The plant species used for the management of delayed and protracted labor were relatively few (n= 10), while those for the management of post partum haemorrhage, abortion, morning sickness and pregnancy edema were many (n= 44). It is important to document and undertake research on traditionally used herbs in order to find scientific evidence for the claims as to the therapeutic efficacy of plants (Sofowora, 1993).

A44 RESPONDING TO CHALLENGES IN WORM CONTROL FOR DONKEYS IN KENYA.

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There are many endoparasites that can inhabit the various organs in the donkey. Of these helminthiasis is the most important in working donkeys due to heavy use and maintenance on low-quality diet. Helminths compete for the little food available in the intestines or lead to blood loss making the animals very weak and prone to diseases and/or death. Weak donkeys also risk falling and injury during work or are deemed lazy by owners who whip the donkeys in response. In the past, helminth control was deemed unnecessary by most donkey owners who believed that donkeys never get treated. With more knowledge gained, mass deworming where there was heavy use of dewormers was adopted. Over time mass deworming presented itself with challenges including high costs associated with deworming donkeys who may not be affected by helminths, risks of resistance through frequent use of antihelmintics and in the long term the creation of a 'naïve' population to common helminths found in population/herds. This is further complicated by human practices including communal grazing of donkeys on largely swampy or poorly drained lands together with conducive weather patterns greatly favour sustained heavy pasture contamination with infective helminth larvae and eggs, and thus high levels of helminthiasis in working donkeys. There is also a growing concern globally for reduction of environmental contamination and responsible use of drugs. There is therefore need to adopt more strategic helminth control system which deals with populations as groupings/herds. Such methods include, pasture management, multiple deworming treatments given at strategic times to prevent the build-up of parasite contamination in the environment. All these approaches should be continually monitored and adjusted to sustain a population.

A45 TRADITIONAL MEDICINE IN KENYA: PAST AND CURRENT STATUS, CHALLENGES AND THE WAY FORWARD

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Traditional medicine is defined by the World Health Organization as the sum total of knowledge or practices whether explicable or inexplicable, used in diagnosing, preventing or

eliminating physical, mental or social diseases. Traditional medicine has persisted in Kenya over the years despite it being outlawed under the Witchcraft Act of 1925 and therefore being practiced underground until 1963. Despite the tremendous contribution made by the Western trained health care providers to the health care delivery in this country, the traditional medical practitioners still have a vital role as 70-80% of the population still rely on them. There is need to strengthen the already existing traditional medicine because of the current challenges of provision of health care which includes issues on affordability of the conventional drugs, accessibility to modern hospitals, drug resistance, existing and emerging diseases and adverse side effects of the conventional drugs. There is a renewed interest by many stakeholders on traditional medicine and research is being undertaken though not coordinated. There are very few scientifically validated herbal products in the market as most of the research is still at the laboratories level. There is an enormous potential in Kenya to exploit the already existing traditional medicine with its many plant species documented to have medicinal value for both human and animals. In order to maximally exploit this potential now and in the future, there is an urgent need for finalizing the national policy framework on the promotion of traditional medicine which will be the base for defining the role of traditional medicine in national health care programmes. This will ensure that necessary regulatory and legal mechanisms are created for promotion and maintaining good practice, authenticity assurance, safety and efficacy of therapies, equitable access to health care resources and information about these resources.

A46 A REVIEW OF PIG PRODUCTION IN WESTERN KENYA: CURRENT STATUS AND FUTURE TRENDS IN CHANGING ENVIRONMENT

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Pigs, whether pure, crossbred or non-descript (local) breeds, play a significant role in the Kenyan economy. This paper specifically addresses potential opportunities and constraints associated with small-holder pig farming in Western Kenya. Community perceptions about local pig keeping and the potential impact this has on productivity are discussed. Current management practices, feeding regimes, disease control strategies, sow breeding and welfare issues are highlighted. The challenge of pig housing is discussed in details; non-confined pigs can destroy household crops, threaten food security and even cause community conflicts. Since the goal of pig production is to produce pork using least costs, the potential use of local feedstuffs as cheap ingredients for pig feeding has been discussed. The safety of pork at the local butcher shops is also discussed. Disease threats including African swine fever, *Taenia solium* cysticercosis and H1N1 are discussed. The role of breeding pigs in sustaining the pig sector is discussed. Opportunities for improved marketing both within and outside the villages are explored. Economics of local pork business is discussed. The role of research and extension in an integrated pig farming system is discussed. It is concluded that pig farming in Western Kenya has a huge but under-utilized potential to enhance productivity, improve livelihoods and reduce rural poverty.

A47 ANIMAL NUTRITION: THE IMPACT OF CHANGING ENVIRONMENT. Mbugua, P.N.

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In 1995, over 2,500 scientists from all over the world came to the conclusion that greenhouse gases emanating from human activities influence global climate. Climate change is defined as a change in the statistical distribution of weather over periods of time that range from decades to millions of years. It can be a change in the average weather or a change in the distribution of weather events around an average. In the recent past, it has been noticed that greater or fewer extreme weather events (e.g. droughts and floods) have been occurring in various parts of the world. In context of environmental policy, climate change usually refers to changes in

modern climate. It may be qualified as anthropogenic climate change or what is called global warming. Climate change caused by human activity has a profound effect on agricultural production, which in turn affects the livelihoods of the people particularly in the developing countries. The key issue in animal nutrition is acquisition and utilization of chemical substances called nutrients that are required for various physiological needs of the animal. The nutrients are obtained from the feeds that the animal consumes. Besides being a nutrient, water is required for production (growth) of the feeds. The impact of climate change on animal nutrition includes: (i) availability of feed; (ii) quality of feed; (iii) change in plant species forming the grazing sward; (iv) availability of water for production/growth of feeds; (v) heat stress and (vi) disease and parasite prevalence and transmission channels. The animals themselves contribute to climate change. It has been estimated that domestic livestock, rice farming, natural gas, petroleum processing and use, coal mining, biomass burning, landfills, livestock manure and wastewater treatment emit 350 million metric tons of greenhouse gases in a year. Domestic livestock account for 23% of the emissions. In both management and nutrition systems, interventions should be formulated to minimize production of greenhouse gases by livestock. This can be done through a number of ways: (i) dietary interventions to change the type of rumen bacteria that have a high propensity to produce methane; (ii) use of anabolic substances such as monensin that reduce methane production in ruminants; (iii) feed processing and supplementation to enhance feed digestibility and (iv) use of feed enzymes to promote digestion of fibre and minimized the adverse effects of water soluble non-starch polysaccharides in poultry and pig production. Solutions to adverse effects of climate change require concerted effort by the various players at policy and technical levels.

A48 A SYSTEMIC APPROACH TO THE ANALYSIS OF THE FEED INGREDIENT SCARCITY IN KENYA

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If every person in Kenya were to eat meat everyday like it is done in the developed world, then Kenya's beef herd would be exhausted in 400 days, the total cattle herd in 600, and the sheep and goat flocks in 90. The country would have to expand its pig and poultry industries by vast proportions (7600 % and 4700% respectively). The size of the pig production industry is tiny, and though the poultry industry is the best in the region its current levels of production pale against the animal proteins required. Producers are mainly subsistence in nature. The main challenge to expanding the non-ruminant enterprises is feed costs and availability. Since a large proportion of all ingredients are imported it is not feasible that costs would come down soon or that availability will not be at the mercy of our neighbours; for even in the best of the weathers, Kenya still imports a significant amount of feedstuffs. A systemic approach technique used to analyse the challenge is reported. Identified causes and effects of the feed scarcity problem are presented. Several potential solutions to the challenge are assessed and the projections of their interventions reported. These include models of land use systems to grow three different cereals and three different protein concentrates under rain or irrigation and using examples of Bura irrigation scheme. The conclusion from the analysis is that availability of animal protein for human food will remain a challenge unless some of the key interventions suggested are implemented.

Key words: Animal feeds, systemic analysis

A49 INDIGENOUS POULTRY PRODUCTION: CURRENT STATUS, CHALLENGES OPPORTUNITIES AND FUTURE TRENDS IN A CHANGING ENVIRONMENT.

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The poultry population in Kenya is estimated at 29.6 million birds. Indigenous chickens, which constitute about 80% of this population are kept by majority of rural households where they contribute to food security, income and social-cultural roles. These dual-purpose birds are raised under free-range management systems with minimum production inputs. The average productivity for the national flock is estimated at 60 eggs per hen per year.

The main challenges of the indigenous poultry sub-sector include low genetic potential, low productivity, poor feeding with little supplementation, diseases, poor management and lack of organized market. At institutional level the sub-sector is constrained by inadequate provision of extension, research and development. There are new concerns of bio-security and exposure of birds to polluted environments that could lead to build up of harmful residues. Opportunities for indigenous poultry production include increased demand for white meat and emerging niche urban markets for quality organic poultry products.

Significant efforts are required to address the constraints and stimulate production through approaches that include sensitisation and capacity building at all levels. Interventions required at producer level include: improved feeding through use of locally available feed supplements, on-farm feed formulation, breed selection, improved housing, better health care and biosecurity measures. At institutional level, there is need to strengthen research, extension, marketing and linkages among the stakeholders.

Towards improvement of the sub-sector, the government has proposed various interventions in the recent policy documents and in particular the Draft National Poultry Policy of 2009 and the National Livestock Development Policy of 2008. The former policy is expected to promote and synergise the various development efforts in the poultry industry and strengthen collaboration of the different players. The policy is further focused on strategies for commercialisation of indigenous poultry, mainly targeted at producer groups and involvement of stakeholder partnerships.

A50 MEASURING IMPROVEMENTS IN WELFARE OF WORKING EQUINES: A CASE OF HESHIMU PUNDA PROGRAMME, KENYA.

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Equines comprise majority of working animals that provide an essential source of tillage and transport resource in developing countries worldwide. Donkeys are used mostly in Kenya where there is an estimated population of 600,000 donkeys. Many of these animals are owned and used by rural and peri-urban populace depending on them for their livelihoods. Donkeys therefore work in harsh environments where their welfare is greatly compromised. Approximately a third of the working donkey population in Kenya is in poor welfare status: suffering various from diseases, injuries, malnutrition, hoof abnormalities and distress. Many of these cases result from abuse, negligence, inadequate resources, cultural beliefs and myths, conflict as well as natural calamities such as drought. In order to address the challenges Heshimu Punda (HP) program seeks to sustainably improve equine welfare in Kenya. This is carried out through provision of a suitable policy environment for welfare-directed efforts, accessibility to affordable veterinary services as well as working closely with communities to establish sustainable sources and management of requisite resources. Equine welfare improvement is periodically assessed through direct health and behavioural observation of

Equine populations. The prevalence of physical parameters such as lameness, body condition scores and skin lesions is recorded together with behavioural observations parameters including demeanour, response to an observer and ease of handling. The results are prioritized and used to identify key welfare needs which form welfare benchmarks and later informing the choice of prioritized interventions required in the development of long-term welfare improvement strategies. Repeated assessments following intervention is used to measure the success of such interventions towards achievement of good equine welfare. An ideal situation is where considerable welfare improvement is achieved but at the very least welfare should remain constant following any intervention.

A51 ANIMAL WELFARE: CURRENT STATUS AND THE FUTURE OF TRENDS IN A CHANGING ENVIRONMENT

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Animal welfare in Africa has not been prioritized by the people and governments. This is in spite of the fact that the livestock industry contributes 6% of the GDP; and the fact that draught animals lead to improved livelihoods as do animals role in personal security especially in urban areas. The low priority animal welfare is primarily due to the fact that, in a bid to achieve development, African governments prioritize issues of poverty, food insecurity, armed conflict, disease, environmental devastation and recurrent disasters such as droughts and floods. Inadequate policy, legislation and law enforcement further compound animal welfare shortfalls. The people themselves have cultural, social and economic constraints that relegate animal welfare to a non-crucial issue. Other stakeholders such as the government services, NGO's both national and international as well as private animal health practitioners are not well networked resulting in duplication, competition and lack of synergy in their attempts to enhance animal welfare.

Here, we review some of the challenges to a recognition by African governments and peoples that animals are sentient beings that have the capacity to suffer, feel pain, distress, fear as well as pleasure, and that there is therefore a need to offer animals care and protection and to end cruelty once and for all. These challenges need to be overcome.

We argue that to overcome these challenges, there is a need to bring to the fore the recognition and appreciation of the role of healthy and high vigor (high welfare) animals in improving the livelihoods of the African people through improving their health via zoonotic disease control and nourishment; provision of services as draught and security animals; as well as the potential for economic gains via trade and tourism. These contributions of animals to people are in line with MDGs.

It is also important to recognize and accept animal welfare as a regionally and globally important issue. To achieve this, a consultative process involving all stakeholders – governments, animal welfare NGOs, the AU, Regional Economic Communities, OIE, FAO and the UN - need to formulate an African Declaration of Animal welfare (ADAW) as a set of common goals that reflect the aspiration and need of the African people as regards animal welfare. It is hoped that such a consultative declaration may be used by governments to inform their animal welfare policy, legislation and guidelines.

A52 PERFORMANCE EVALUATION OF GOAT BREEDS IN THE SOUTH WESTERN AGRO-ECOLOGICAL ZONE OF UGANDA

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A study was conducted in the south western agro-ecological zone (SWAEZ) of Uganda on performance evaluation of goats under both on-station and on-farm conditions. The evaluation covered the districts of Mbarara, Kiruhura, Ibanda and Sembabule. The main measurements taken during the evaluation were body weight and heart girth which were regularly taken on different goat breeds found on selected farms and on-station at Mbarara Zonal Agricultural Research and Development Institute (MbaZARDI). The data was collected on a continuous basis. At MbaZARDI, goat measurements took three years from July 2006 to June 2009 while on-farm data was collected for a period of 9 months from October 2008 to June 2009 from the districts of Mbarara, Kiruhura, Ibanda and Sembabule. Results for both on-station and on-farm showed a significant effect of kid genetic group on body weight ($p < 0.05$). The sex of the kids also significantly influenced kid body weight ($p < 0.05$). Kids born during the dry season were heavier than those born during the wet season. The study found that there was generally no significant effects of year of births or district of origin on body weights of the kids but significant in months 4 ($p = 0.0049$) and 5 ($p = 0.0001$). The study concludes that the genetic group was the most important effect on body weight of goats compared to other factors in the SWAEZ of Uganda. The effect of year, sex and season varied but contributed relatively little to the weight differences. Crossbreeding Boer and indigenous goats entails provision of appropriate guidelines on changed genotype and need for improved breeding, feeding and health care management practices so that the genetic potential of grade animals is effectively achieved. Phenotypic and genetic characterisation of different goats is needed to validate the results and establish accurate optimum levels of crossbreeding under on-station and on farm production environments.

Key words: Goats, breeds, indigenous, crossbred, weight, SWAE zone

POSTER PRESENTATION

P1 REARING METHODS DO NOT AFFECT GROWTH PATTERN OF THE HELMETED GUINEA FOWL (*Numida meleagris*)

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1. Growth pattern of helmeted guinea fowl keets was studied in two types of housing management: an open-air system (OAS) and a deep litter system (DLS). Changes in live body weight, wingspan, breast height, and head width and helmet height were analysed from four to twenty-eight weeks of age.
2. A common growth pattern was obtained in both systems. The growth period in the two systems was from four to fourteen weeks after which there were no further changes in growth parameters except live body weight and helmet height.
3. The results show that the helmeted guinea fowl can be reared successfully for meat production in either of the two systems.

Key words:

Helmeted Guinea Fowl; *Numida meleagris*; Growth; Husbandry; Environment

P2 RETROSPECTIVE STUDY ON CANINE INFERTILITY IN NAIROBI AND ITS ENVIRONS:

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A twenty year retrospective study was carried out in the Small Animal Clinic, University of Nairobi, Kenya and in a private Small Animal Clinic in Nairobi between the years 1988 to 2008. A total of 6548 bitches had been presented with reproductive problems. The cases were categorically grouped according to the type of infertility diagnosed. Non-infectious infertilities were 69% and infectious types were 31%. Only 2% of the latter were confirmed in one clinic. 16% of non-infectious infertility were managerial types, 20.1% anatomical types, 5.4% physiological types and 27.4% unclassified / miscellaneous cases. The cases classified under infectious infertility consisted of; vaginitis/endometritis/metritis (36.3%), pyometra (25.3%), abortions (21.5%), vaginal discharge (11.7%) and miscarriages (5.1%). The incidence of infertilities was highly common in breeds of German shepherd (39%), Doberman (6%), Rottweiler (12%) and their crosses (43%). The percentage of the reproductive cases presented in both clinics had no statistical difference at ($p < 0.05$). It was evident from the results of this study that infectious infertility exists among the bitches in Kenya and it would be beneficial to do further studies to establish the causative agents to avert any possible outbreaks of zoonotic diseases.

Key words: Canine, Infertility, Diagnostic protocols

P3 AN ECONOMIC ANALYSIS OF THE CONTRIBUTION OF LIVESTOCK TO HOUSEHOLD INCOMES IN MIGORI DISTRICT, KENYA.

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Agricultural activities significantly contribute to household income in rural parts of Kenya. This study was conducted in Uriri, Karungu and Nyatike divisions of Migori district. The objective of the study was to examine the contribution of livestock to household incomes in relation to livelihood outcomes. Survey instruments were used to collect cross-sectional data from 212 households selected non-randomly. The study findings from income calculation indicate that there was an association between livestock ownership and mean household incomes (χ^2 5df, $P < 0.000$). Households engaged in livestock farming earned 44 percent more in per capita income than those without livestock. Livestock as an economic asset provided multiple benefits to their owners. The gross margins attained from dairy were 3, 5 and 25 times higher than the gross margins from maize enterprise in Uriri, Karungu and Nyatike divisions respectively. Inadequate knowledge on animal husbandry, lack of financial capital, livestock diseases and drought were the major threats to livestock enterprises (SWOT analysis). Livestock were shown to be important livelihood asset for small-scale farmers. The study recommends that for agricultural policy to increase rural income, the complementarity of livestock and crop production through the use of animal manure must be emphasized to increase agricultural production gains in farm households. Farmers should be educated on feed conservation and animal husbandry techniques to increase livestock productivity. Training of community based animal health workers to attend livestock health problems is necessary.

P4 CHARACTERIZATION OF BABESIA GIBSONI PYRUVATE KINASE AS A NOVEL DRUG TARGET FOR PROSPECTIVE ANTIBABESIA DRUGS SCREENINGS

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The recombinant DNA technology is a biotechnology tool, which can be used to manipulate genes that encode molecular drug targets and thus is a good strategy for drug discovery. Therefore, we have used this technology to characterize *Babesia gibsoni* pyruvate kinase (BgPyrK) as a drug target for discovery of lead antibabesia drugs. To achieve this objective, we isolated a cDNA encoding BgPyrK from the parasite's expressed sequence tag database and analyzed its polypeptide by bioinformatics. Additionally, the gene was expressed in *Escherichia coli* and the recombinant (r) BgPyrK protein was characterized by using, sodium dodecyl polyacrylamide gel electrophoresis (SDS-PAGE), confocal laser microscopy and by biochemical analyses. The full-length cDNA encodes an approximately 57-kDa polypeptide having 509 amino acid residues, which shared significant homology with the pyruvate kinases of *Babesia bovis*, *Theileria* spp, and *Plasmodium* spp. The polypeptide had pyruvate kinase super-family domain with an active-site signature sequence containing a lysine residue responsible for enzymatic activity and glutamic acid residue that binds Mg²⁺ ion. The rBgPyrK protein, fused with Glutathione S transferase (GST), revealed a specific band of approximately 83-kDa when analyzed using SDS-PAGE. Confocal microscopy revealed that the endogenous BgPyrK was predominantly localized in the parasite cytosol where it is believed to be involved in glycolysis. The rBgPyrK enzyme showed some catalytic activity albeit at a lower rate. Next, we propose that rBgPyrK enzyme could be used to screen lead compounds and thus assist in the discovery of novel antibabesia drugs.

Key words: *Babesia gibsoni*, pyruvate kinase, drug target

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P5 AN ACUTE RESPIRATORY DISTRESS SYNDROME DUE TO BABESIOSIS IN A DOG

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A case of acute Canine Babesiosis manifested by acute respiratory distress syndrome (ARDS), acute renal failure (ARF) and cerebral Babesiosis is reported in a five year old male Japanese spitz. The patient was noticed to have developed sudden dyspnoea. The main presenting clinical signs included laboured breathing, broad-based stance but preferred recumbency, pallor and seizures. Blood smears from the ear tips revealed presence of multiple *Babesia* parasites in the erythrocytes. Hematology results revealed slight leucocytosis (20.47 m /mm³), severe anemia (1.41 m /mm³) and thrombocytopenia (76 m /mm³). Urinalysis suggested renal pathology due to marked proteinuria and glucosuria. Microscopic examination of the urine revealed presence of leucocytes in the urine. Despite

aggressive measures to stabilize the patient, it died within an hour. Autopsy results confirmed Canine Babesiosis with generalized icterus. From this case it is concluded that the complicated form of Canine Babesiosis has several clinical presentations depending on the organ affected. Thus complicated form of Canine Babesiosis should be one of the differential diagnosis of cases presenting with pallor of mucous membranes, seizures, acute renal failure and acute respiratory distress. This is the first recorded case of complicated form of canine Babesiosis in the Small Animal Veterinary Clinic in the Faculty of Veterinary Medicine, University of Nairobi.

Keywords: Canine Babesiosis, Clinical signs, Complications, Pathogenesis

P6 PREVALENCE OF PORCINE CYSTICERCOSIS AND RISK FACTORS FOR TAENIA SOLIUM CYSTICERCOSIS/TAENIOSIS IN THREE DIVISIONS OF HOMA BAY DISTRICT, KENYA.

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A cross sectional study was undertaken to determine the prevalence of *Cysticercus cellulosae* in three divisions of Homa Bay District. Pig farming in the district is mainly by free-range, with most farmers keeping commonly one to six pigs. The study involved ante mortem lingual examination and palpation. The prevalence of risk factors for *Taenia solium* cysticercosis and taeniosis was determined by administration of a standard questionnaire at household level. Most of the pig farmers (65.8%) were females and of those interviewed 77.9% had undergone formal education. Farming was the main occupation (85.9%) and high proportions (88%) of pigs kept were for sale. The pigs were mainly tethered (98.4%) during the planting season, (97.9%) during growing season and (98.4%) during the harvesting season. Farmers fed their pigs on kitchen left over and pasture (46.9%) and kitchen left over, sweet potatoes and pasture (25.9%). None of the farmers supplemented their pigs with commercial feeds.

The ante mortem lingual palpation and examination of 193 pigs showed presence of palpable cysts was estimated at 5.83 % (14 of 240) and 1.25% suspected (3 of 240). Those practicing home slaughter without official meat inspection were 13.98% (27 out of 193). The number of homes without latrines was 100 out of 193 = 51.8 %. Previous tapeworm experience was 94.8% (183 out of 193).

Results of this study indicate that porcine cysticercosis is prevalent in free range pigs in three divisions of Homabay District. The low levels of knowledge of occurrence and of the mode spread of *T. solium* is a probable contributor to the maintenance of the parasite. Lack of proper housing, lack of latrines and failure to use those that are present and active tapeworm infestation also contribute the perpetuation of the parasite in the District.

Education of the farmers on the need of proper housing for the pigs, construction and use of latrines could go a long way in reducing the prevalence. A more sensitive test ought to be carried out to establish the almost true prevalence considering lingual examination and palpation has a lowly sensitivity.

P7 TRYPANOSOMOSIS PREVALENCE IN LAKE VICTORIA, MERU-MWEA AND LAE BOGORIA TSETSE BELTS OF KENYA.

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Trypanosomosis remains a major livestock disease of economic importance in Kenya. In order to determine the baseline parasitological data, the prevalence of trypanosomosis in cattle was investigated in three tsetse belts in Kenya: Lake Victoria Basin, Meru-Mwea Belt and Lake Bogoria tsetse belt. A total of 4,233 animals were bled from a random selection of 46 sampling sites in the three regions, in addition 773 persons were examined in the Nyanza region. Blood samples were collected into heparinised haematocrit tubes from the ear vein and examined for trypanosomosis using the buffy coat technique. The packed cell Volume (PCV) was read for each sample using the micro-haematocrit reader. All the samples with PCV values below 20 % but negative by microscopic techniques were subjected to Polymerase Chain Reaction (PCR) analysis. All the sites in the villages where samples were collected were geo-referenced and GIS maps produced. In the Lake Victoria region, high trypanosome prevalence rates in animals were recorded in three sampling sites located on Kenya Uganda border in Teso District. The prevalence rates recorded in these three sampling sites were: Katotoi, 25.5%, Obuchun, 19.4% and Moding 18.5%. The highest prevalence rate recorded in the Lake Bogoria region was recorded in three sampling sites: Mbechot, Emsos and Olkokwe with prevalence rate of 16.2%, 10.8% and 10.5% respectively. In the Meru/Mwea tsetse belt high prevalence rates were recorded in three sites: Makutano, Mbondoni and Kereria at 15.6%, 12.9% and 9.2% respectively. Analysis of blood samples collected in the Lake Victoria tsetse belt using PCR techniques did not reveal the presence of human infective parasites in the area. It is concluded that animal trypanosomosis prevalence is high in the three regions and there is need for harmonized disease control at the border regions.

Key words: Trypanosomosis, prevalence, Lake Victoria, Lake Bogoria and Meru/Mwea regions

P8 APPLICATION OF CONJOINT EXPERIMENT TO EXPLORE FARMER PREFERENCES FOR CONTAGIOUS BOVINE PLEUROPNEUMONIA VACCINE AND VACCINATION ATTRIBUTES IN NAROK DISTRICT OF KENYA

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Contagious Bovine Pleuropneumonia (CBPP) is an economically important disease in most of sub-Saharan Africa. A conjoint experiment and ordered probit regression models were used to measure the preferences of farmers for CBPP vaccine and vaccination attributes. This was with regard to inclusion or not of an indicator in the vaccine, vaccine safety, vaccine stability as well as frequency of vaccination, vaccine administration and the nature of vaccination. The experiment was carried out in 208 households in Narok District of Kenya between October and December 2006 using structured questionnaires, 16 attribute profiles and a five point Likert scale. The factors affecting attribute valuation were demonstrated by a two-way location interaction model. The study also demonstrated the relative importance (RI) of attributes, the important trade offs between attributes and the compensation value of attributes. The coefficient estimates showed that farmers prefer a vaccine that has an indicator, is 100% safe and is administered by the government ($p < 0.0001$). Preference for annual vaccination, stability of vaccine and elective vaccination was not unanimous ($p > 0.05$). Price was the least important (RI=0.5%) attribute while inclusion of an indicator in the vaccine was the most important (RI=43.6%). Of the 22 household factors considered, 15 affected attribute valuation. The trade offs between inclusion of an indicator and safety and other vaccine attributes were high (14.6-18.5) while those between vaccination attributes were moderate (4.3-4.5). The compensation values for indicator, safety, stability and nature of vaccination were positive while those for frequency of vaccination and administration were negative. The study concluded that the farmers in Narok District had specific preferences for vaccine and vaccination attributes. These preferences were conditioned by various household characteristics and disease risk factors. On average the farmers would need to be compensated / persuaded to accept biannual and private vaccination against CBPP.

Keywords: Conjoint experiment, farmer preferences, Contagious Bovine Pleuropneumonia (CBPP), Vaccines, Vaccination, Narok District, Kenya.

P9 AN ESTIMATION OF THE IMPACT OF CONTAGIOUS BOVINE PLEUROPNEUMONIA AND ITS CONTROL BY VACCINATION: A CASE OF NAROK DISTRICT OF KENYA.

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Contagious bovine pleuropneumonia (CBPP) is an important disease in sub-Saharan Africa. Data were collected in a cross-sectional survey involving 232 households, a longitudinal survey involving 39 herds, 32 outbreak investigations and a vaccination appraisal between July 2006 and March 2008 in Narok District. This was to measure the impact of CBPP and to determine the benefits and costs of vaccination against CBPP. Spreadsheet models estimated the cost of vaccination at KSh. 34.6-72.2 per animal. The value of annual production losses was KSh. 113.1 million. Of this, KSh. 38.3 million (33.9%) was due to mortalities, KSh. 43.8 million (38.7%) due to morbidity while KSh. 31.0 million (27.4%) was due to reproduction losses. The value of losses associated with response to outbreaks was KSh. 12.84 million. The average household losses due to CBPP were KSh. 275.3 thousand while the average income from cattle was KSh. 118.8 thousand. The annual cost of preventive CBPP vaccination was KSh. 8.53 million of which 64.8% was due to direct vaccination costs and 35.2% due to indirect costs following adverse reactions to vaccination. Following losses due to adverse reactions, 25% of cattle keepers may not vaccinate their cattle in subsequent vaccinations. A benefit cost analysis demonstrated the Benefit Cost Ratio (BCR) to be 5.64-9.60 at community level and higher at household level (9.8 -12.81). Biannual vaccination would raise net benefits but lower BCR (3.95-5.86). A break even analysis showed that the risk of herd outbreak would need to fall to less than 1.1% before it becomes uneconomical for cattle keepers to vaccinate against CBPP. In conclusion, CBPP has high impact on cattle productivity and has the potential to wipe out an entire household income from cattle. Vaccination is beneficial in the control of CBPP even if the risk of herd

outbreaks were very low. Adverse reactions would discourage cattle keeper participation in vaccinations.

Key words: Impact, Contagious Bovine Pleuropneumonia, Vaccination, Narok, Kenya, Benefit –cost analysis, Break even analysis.

P10 THE EFFECT OF AQUEOUS, ETHANOL AND CHLOROFORM EXTRACTS OF EUCLEA DIVINORUM (EBENACEAE) AND RICINUS COMMUNIS(EUPHORBIACEAE) PLANTS ON ISOLATED RABBIT UTERINE STRIPS.

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The effect of *Euclea divinorum* and *Ricinus communis* root bark extracts on isolated gravid and non gravid rabbit uterine strips was investigated in the presence and absence of oxytocin and prostaglandin F_{2α}. The uterine strips were exposed to a range of aqueous, ethanol and chloroform extract concentrations (0.5 to 4.0 mg/ml). The contractile response was recorded isometrically on a kymograph+ stimulator. The data was analyzed using ANOVA. P values < 0.05 were considered significant. All uteri exhibited a strong initial contraction following administration of the extracts in a dose dependent manner. Upon recovery the frequency of resumed contractions varied with the plant extract. However chloroform *Euclea divinorum* and *Ricinus communis* extracts exhibited an initial long relaxation phase followed by contractions of the uteri. The result of this study indicates that the herbal extracts cause rabbit uterine myometrial contractions that mimic contractions due to oxytocin. It is tempting to argue that when consumed by pregnant women, the aqueous and ethanol extracts of both plants would augment endogenous oxytocin / prostaglandin effects to cause parturition. The chloroform extract on the other hand seemed to initially have a relaxing effect on the rabbit uterine strips. An effect that is difficult to explain on the basis of the above experiments. It is recommended that further pharmacokinetic and toxicological studies are required to determine the active components, possible mechanism of action, effective and lethal dose levels of the plant extracts.

Keywords: *Euclea divinorum*, *Ricinus communis*, augment, oxytocic effect, herbal remedy, labour, prostaglandin F_{2α}, oxytocin.

P11 SOME PATHOLOGICAL CHANGES IN NILE TILAPIA AND NILE PERCH FROM LAKE VICTORIA

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Gross and microscopic lesions especially those associated with pollutants were investigated in Nile tilapia (*Oreochromis niloticus*) and Nile perch (*Lates niloticus*) from Lake Victoria. A total of 104 live fish were bought from fishermen from Homa Bay and Suba districts. During

post mortem examination, lesions observed were recorded; and kidney, gills, liver, spleen, heart, stomach, intestine and gonadal tissues taken and preserved in 10% buffered formalin for histological processing. Gross lesions observed were hyperemia, hemorrhages in various tissues; skin ulcers, eye opacity; cooked liver appearance, fibrosis, gray spots and bile imbibitions; atrophied and cystic gonads; and fish skeletal deformity. Histological lesions were gill aneurysms, kidney tubular lumen occlusions, increased melanomacrophage aggregation in the liver, kidney and spleen; liver sinusoidal hemorrhages, fatty degeneration, hepatocytes' vacuolations, necrosis, bile stasis and granulomas; kidney granulomas; testicular and ovarian degeneration and cysts; myocarditis and myositis. The liver had majority lesions that were severe in both fish species. These lesions can be caused by variable aetiologies, including pollutants. In all, 63% of the *Oreochromis niloticus* and 58% *Lates niloticus* had histological lesions. Further studies are required to establish the cause of the lesions.

P12 TRYPANOSOMA INFECTION IN CARRIER FISH OF LAKE VICTORIA, KENYA

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The carrier status of the haemoparasite in fish was investigated in randomly selected Nile tilapia (*Oreochromis niloticus*) and Nile perch (*Lates niloticus*). Blood was drawn from the heart using needle and syringe from twenty two live fish (12 tilapia and 10 Nile perch). Thin blood smears were prepared, fixed in methanol, stained with Giemsa and observed under a light microscope. Trypanosomes were observed in five (41.6%) Nile tilapia fish but not in Nile perch. These preliminary findings suggest that Nile tilapia may be more susceptible to *Trypanosoma* spp. infection than the Nile perch. There is need for further studies to explain the susceptibility difference, parasite role on the health of the fish and whether pollution or climate change have role.

P13 TRAUMATIC DIAPHRAGMATIC HERNIA IN 3 CANINES, A CHALLENGE TO MANAGEMENT

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This paper reports 3 cases of traumatic diaphragmatic hernia in dogs presented to the Small animal Clinic, of the University of Nairobi over a period of 5 years. The patients presented with sudden onset of dyspnea associated with an incidence of trauma. Two of the cases died on the burky table during positioning for radiography while the third died on the surgery table. Radiographic and postmortem examination were used to confirm the clinical diagnosis of diaphragmatic hernia. From the reported cases diaphragmatic hernias have shown to be life threatening situations which require prompt diagnosis and critical patient care for any success. This report outlines the delicate nature of patients with traumatic diaphragmatic hernia and the need for prompt accurate diagnosis and immediate management.

P14 CONTAMINATION LEVELS OF WASTEWATER, RE-USED FOR IRRIGATION, SOILS AND VEGETABLES UNDER THE IRRIGATION.

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Due to scarcity of water, Kenya, as in many other countries, uses wastewater extensively for irrigation. This study was carried out to evaluate levels of contamination of the Kenyan wastewater, the irrigated vegetables produced, and the respective soils. Comparison was also made between vegetables obtained at the farm and those bought at possible market outlets. The area covered was Kibera and the markets included Gikomba, Wakulima and Korogocho. For wastewater and vegetables, emphasis was on bacteriology: total coliform count and presence of *Vibrio cholerae* and *Salmonella Typhi*; and parasitology: mainly helminthes (through detection of larvae and eggs) and protozoa; while the soil samples were screened only for parasites. This was done using standard bacteriological and parasitological techniques. High coliform counts were detected from the wastewater and vegetables. They were statistically significantly ($p < 0.05$) above the approved WHO accepted levels of 10,000 organisms per 100 milliliters; market vegetables registering statistically ($p < 0.05$) higher counts than farm ones. One wastewater sample yielded *Vibrio cholerae*. These samples, including the soil ones, also yielded various parasites, including *Entamoeba histolytica*, *Entamoeba coli*, *Balantidium coli*, *Schistosoma* species, *Taenia* species and *Ascaris lumbricoides*. The high total coliform count in wastewater is an indication that the people concerned were using almost raw sewage for irrigation. The various parasites that have been isolated are a ready source for infection to the wastewater users and those that handle and/or consume the resultant vegetables. The isolation of *Vibrio cholerae*, though from one sample, manifests the danger from pathogenic bacteria. These are areas where people hardly use toilets, so in case of infection (cholera, typhoid fever, etc), the disease will spread very fast through the community. Interestingly, coliform counts were found to be higher on market vegetables than on farm ones. This introduces another possibility of more contamination of the vegetables occurring as they are handled, down the market chain.

P15 INVESTIGATION OF HYGIENE STANDARDS OF CARCASSES SLAUGHTERED IN FIVE LOCAL SLAUGHTERHOUSES OF SOMALILAND, SOMALIA

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Four hundred (400) swab samples were collected from small ruminant carcasses slaughtered from five local slaughterhouses of Somaliland state of the Republic of Somalia. The samples were analyzed for total viable counts, total coliforms and presence of *Salmonella* spp for purposes of assessing the levels of meat contamination of carcasses from these facilities. In addition, sources of meat contamination were identified. Carcasses sampled from the privately managed local slaughterhouse of Hargeisa had very low levels of contamination as compared to those managed by the municipalities (Berbera, Burao, Borama and Gabiley local slaughterhouses). This study was meant to establish sources of meat contamination in the selected slaughter facilities and recommend pragmatic mitigation measures.

P16 EARLY DETECTION OF HYPERGLYCEMIA USING GLYCATED HEMOGLOBIN IN MICE MODEL

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Experiments on animals play an important role in the study of noninfectious diseases, insulin development for diabetes treatment, kidney failure blood dialysis, transplantation techniques, and various types of surgery advancements.

In this study hyperglycemia development in mice induced with alloxan monohydrate was determined using glycated hemoglobin and compared with blood glucose.

Effective dose for making the mice hyperglycemic was first determined for alloxan monohydrate concentrations and found to be 300mg/kg body weight single dose. Ten mice were randomly selected, weighed and assigned into test and control groups (5 per group). Test group was injected with 0.2ml of 300mg/kg alloxan while control group received 0.2ml of sterile water intraperitoneally.

The blood glucose in the test group increased steadily from 3.7mmol/L (day1) to 8.4mmol/L (day 7). Glycated hemoglobin in the test group mice increased marginally from 4.75% to 5.18% compared with the control group at 4.85% to 4.90% with glucose levels stabilizing at 5%.

The experiment demonstrates that glycated hemoglobin testing can be used to detect sub-clinical diabetes mellitus and early initiation of treatment and management.

P17 AN OUTBREAK OF SHEEP AND GOAT POX DISEASE IN A FARM IN KIAMBU WEST DISTRICT, KENYA

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Sheep and goat pox is a contagious viral disease of small ruminant (goat and sheep) where morbidity in adult sheep and goats may range up to 80% with some subclinical infections and mortality can approach 50%. In susceptible lambs and kids under one month of age, morbidity may approach 100% and mortality as high as 95%.The outbreak in this farm affected 42(64.6%) out of 65 goats and 1(20%) out of 5 sheep. One of the affected goats had aborted while 10 adult goats and 3 kids had died. The farmers had introduced goats from outside into his flock prior to the outbreak. The major clinical signs in affected goats and sheep were lacrimation, oculonasal discharges, nodular lesions in the perineum, inguinal, axillae and muzzle and enlarged prescapular lymphnodes. The nodular swelling on the skin and muzzle and enlarged lymph nodes were also noted in the postmortem. The clinical signs and postmortem examination were used to arrive at the diagnosis. The affected sheep and goats responded well to sulphamethaxazole and trimethoprim combination treatment. The

farmers was also advised to have the whole flock vaccinated. There is a need to investigate this disease in the area where the goats introduced originated from.

P18 ACUTE TOXICITY AND CYTOTOXICITY OF AQUEOUS AND CHLOROFORMIC EXTRACTS OF RAPANEA MELANOPHLOEOS

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Rapanea melanophloeos is a medicinal plant widely utilized in ethnomedicine to treat helminthiasis in man and animals. Hitherto, information on its toxicity to man or animals is scanty.

In the current study, the chloroformic and water extracts of the bark were tested in Sprague Dawley rats and brine shrimp (*Artemia salina*) to evaluate its acute toxicity and cytotoxicity.

The water extract showed significant cytotoxic activity to brine shrimp with a lethal concentration (LC₅₀) of 59.37 µg/ml while the chloroformic extract had no significant bioactivity on brine shrimp; (LC₅₀ of 1250 µg/ml).

In the acute toxicity study, the no observed adverse effect level (NOAEL) for the water extract was 300mg/kg and lowest observed adverse effect level (LOAEL) was 500mg/kg; which were lower than those of the chloroformic extract (NOAEL of 500mg/kg and LOAEL of 1000mg/kg).

The median lethal dose of the water extract was above 7500mg/kg while the chloroformic extract did not cause mortality at 12500mg/kg.

The most overt signs of toxicity for both extracts were depression, inactivity, somnolence, delayed reaction to stimuli, lethargy, piloerection and lackluster eyes. Recovery was complete in 48 hours and the extracts did not cause significant change in body weight in the treatment groups within the 2 weeks of experimentation.

Necropsy of the animals that died at the highest doses of both extracts at 24 hours post treatment revealed general congestion and enlargement of the liver, spleen and kidneys. There was mucoid content in the gastrointestinal tract of the animals dosed with the water extract.

The two studies show that both extracts are harmless, though the aqueous extract had a lower toxic dose than the chloroformic one, probably because of its higher bioavailability as compared to that of the chloroformic extract. The plant is therefore unlikely to cause toxicity at the therapeutic doses used (≈50mg per dose).

P19 USE OF ALBENDAZOLE - LEVAMISOLE COMBINATION IN CONTROLLING MULTIPLE ANTHELMINTIC RESISTANCE IN A SHEEP FARM IN KABETE KENYA

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The albendazole-levamisole drug combinations were evaluated on their ability to control natural helminth infections in a sheep farm where resistance to the individual anthelmintic had previously been reported. Forty (40) sheep of mixed ages and sex were randomly allocated to four equal groups. The first three groups were treated with albendazole, levamisole and albendazole-levamisole combination respectively while the fourth group remained as the untreated control. Rectal faecal samples were collected from all the animals on the day of treatment (D-0) and fourteen days post-treatment (14 DPT) and the eggs per gram of faeces (EPG) determined. The anthelmintics efficacies were evaluated based on the faecal egg count reduction percentage (FECR %). Resistance to the individual drugs was still evident at FECR % of 38.7% for albendazole and 81.6% for levamisole. Combining the two drugs resulted in a higher efficacy at 98.1% FECR %. The drug combining may therefore offer a temporary solution in helminth control on the farm as other control measures are sort.

P20 THE EPIDIDYMIS OF RUFIOUS SENGI (ELEPHANTULUS RUFESCENS): STRUCTURE, ADAPTATIONS AND ROLE IN SPERM MATURATION AND STORAGE

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Sengis are testicondid endemic african mammals that constitute the order Macroscelidae. The epididymides of five male rufous sengis (*Elephantulus rufescens*) were studied both macroscopically and microscopically to describe the structure and possible features or adaptations making it a suitable site for sperm maturation and storage in testicondas. The epididymis had three distinct topographic regions; the caput, corpus and cauda epididymis. The caput and cauda epididymis were placed further apart; the former occurring as a longitudinal mass on dorsolateral border of the testis while the latter occurred as a pear-shaped mass placed laterally between the rectum and the pelvic urethra, the two being connected by a slender corpus epididymis. The epithelium comprised of principal and basal cells with the former exhibiting numerous secretory granules and apical blebbing in the caput. In the cauda, principal cells had numerous vacuoles and its lumen was densely packed with spermatozoa and occasional masses that appeared to engulf spermatozoa. This study demonstrates that the principal cells of the caput of sengi produces materials either through merocrine or apocrine secretion, the latter being shown by apical blebs that are shed off as epididymosomes, which in turn transfers epididymis-secreted proteins to the plasma membrane of spermatozoa. Additionally, the study has shown that the cauda epididymis remarkably descends to a site probably cooler than the core body temperature for optimal sperm storage, and the numerous vacuoles indicating its involvement in fluid reabsorption and phagocytosis of residual bodies and damaged spermatozoa.

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P21 FACTORS LEADING TO LACK OF CONFIRMATION AND UNDER-REPORTING OF FOOT-AND-MOUTH DISEASE IN THE SOMALI- ECOSYSTEM IN KENYA

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Foot-and-Mouth disease (FMD) is an endemic disease in Kenya with regular reporting in all the provinces of the country except North-Eastern Province. Serotype O and A have been encountered in the past¹ in the region but current epidemiological maps on FMD show no occurrence of the disease in the whole Somali- ecosystem (SES) in Kenya. The objective of this study was to investigate why the disease is under-reported in the SES where the main occupation of the people is pastoralism with a high population of livestock (over three million).

Two sets of semi-structured questionnaires were used, one administered to the Veterinary service providers and the other to animal owners. A total of 95.4% of officers interviewed indicated that they face various constraints in collection of samples for confirmation of FMD. These constraints in order of significance are; lack of transport, difficulties maintaining cold chain, no sampling kits, no pastoralists cooperation, poor infrastructure, poor disease reporting channels, inadequate personnel and funding.

Those interviewed were familiar with the disease as symptoms described were similar to the conventional clinical signs associated with Foot-and-Mouth disease. Several risk factors were identified, the main ones being: common watering points, nomadism, poor surveillance, limited farmer awareness on control, porous borders, no /uncoordinated and very limited

vaccination, wildlife-livestock interface, lack of farmer cooperation and insecurity/cattle rustling.

Findings of this study show that FMD is common in the SES but since the disease is short-lived in the indigenous herd, most pastoralists do not rate it as most important. One of the reasons for not reporting FMD to the Veterinary Department is fear of quarantine which would affect movement of pastoralists in search of pasture or trade in animals. Both groups interviewed concurred that routine vaccination is necessary to wage the way forward in control of FMD in the area.

P22 PERFORMANCE EVALUATION OF GOAT BREEDS IN THE SOUTH WESTERN AGRO-ECOLOGICAL ZONE OF UGANDA

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A study was conducted in the south western agro-ecological zone (SWAEZ) of Uganda on performance evaluation of goats under both on-station and on-farm conditions. The evaluation covered the districts of Mbarara, Kiruhura, Ibanda and Sembabule. The main measurements taken during the evaluation were body weight and heart girth which were regularly taken on different goat breeds found on selected farms and on-station at Mbarara Zonal Agricultural Research and Development Institute (MbaZARDI). The data was collected on a continuous basis. At MbaZARDI, goat measurements took three years from July 2006 to June 2009 while on-farm data was collected for a period of 9 months from October 2008 to June 2009 from the districts of Mbarara, Kiruhura, Ibanda and Sembabule. Results for both on-station and on-farm showed a significant effect of kid genetic group on body weight ($p < 0.05$). The sex of the kids also significantly influenced kid body weight ($p < 0.05$). Kids born during the dry season were heavier than those born during the wet season. The study found that there was generally no significant effects of year of births or district of origin on body weights of the kids but significant in months 4 ($p = 0.0049$) and 5 ($p = 0.0001$). The study concludes that the genetic group was the most important effect on body weight of goats compared to other factors in the SWAEZ of Uganda. The effect of year, sex and season varied but contributed relatively little to the weight differences. Crossbreeding Boer and indigenous goats entails provision of appropriate guidelines on changed genotype and need for improved breeding, feeding and health care management practices so that the genetic potential of grade animals is effectively achieved. Phenotypic and genetic characterisation of different goats is needed to validate the results and establish accurate optimum levels of crossbreeding under on-station and on farm production environments.

Key words: Goats, breeds, indigenous, crossbred, weight, SWAE zone

P23 THE ANTIBACTERIAL ACTIVITY OF SOME MEDICINAL PLANTS USED IN MERU CENTRAL DISTRICT, KENYA

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Five medicinal plants used by traditional medical health practitioners (TMP) in Meru central district namely: *Piliostigma thonningii*, *Ajuga remota*, *Ocimum suave*, *Erythrina abyssinica* and *Harissonia abyssinica* were investigated for their antibacterial activity against standard

bacterial cultures namely; *Staphylococcus aureus*, *Bacillus cereus*, *Escherichia coli* and *Pseudomonas aeruginosa*. The antibacterial activity of the methanolic and water extracts was determined using the minimum bactericidal concentration (MBC) and minimum inhibitory concentration (MIC). Gram positive bacteria (*S.aureus* and *B.cereus*) were more susceptible to the plant extracts than Gram negative bacteria (*E.coli* and *P.aeruginosa*). The MIC and MBC of the positive control antibiotics (Ampicillin for gram positive and Gentamycin for gram negative) were less than 1mg/ml. The most susceptible bacteria was *S. aureus* followed by *B.cereus* while the most resistant was *E.coli* followed by *P.aeruginosa*. Methanolic extracts of *P. thonningii* stem and *Ocimum suave* leaves had the best antibacterial activity against the four bacterial species. There was no significant difference between the water and methanolic extracts of all the plants. These results justify the use of these plants by the traditional medical practitioners for management of bacterial conditions and further investigation on their safety and phytochemistry is indicated.

P24 BIOAVAILABILITY OF COBALT AND ANTHELMINTIC EFFECTS OF ALBENDAZOLE FORTIFIED WITH COBALT (VERMITAN SUPER) IN SHEEP.

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This experiment evaluated the bioavailability of cobalt and the anthelmintic effects of albendazole fortified with cobalt (Vermitan super^R) in sheep over a period of 28 days. Cobalt chloride was added to provide 0.31ppm to albendazole. Albendazole preparation without cobalt chloride was also used as the positive control. Twenty eight cross bred wether lambs initially weighing 22.8±3.3 kg were randomly allotted to one of the two treatments. Blood samples were collected and live weight gain determined at 7 day intervals and tissue samples collected before the experiment, on day 14 and at experimental termination. Plasma and liver tissues were analyzed for cobalt concentrations. Faecal samples were collected before treatment and on day 14. Faecal egg counts were determined using the McMaster technique. Anthelmintic efficacy of the two albendazole preparations was evaluated using the faecal egg count reduction test.

Lamb bodyweight was not influenced by anthelmintic cobalt concentrations ($P>0.15$). Both plasma and liver cobalt concentrations in the treatment group increased at each collection period ($P<0.01$) and the liver had an anthelmintic cobalt concentration \times time interaction ($P<0.01$). There was a strong positive correlation ($r = 0.92$) between plasma and liver cobalt concentrations. Liver had the highest cobalt concentrations. Both gross and microscopic evaluation of tissues revealed no significant lesions for any treatment groups. All strongyle eggs were cleared by day 14 in both treatment groups. These results suggest that ≤ 0.31 ppm anthelmintic cobalt as chloride will provide plasma cobalt levels of 0.21ppm by the 28th day post administration, but have no advantage over non fortified albendazole in anthelmintic control.

Key words: Cobalt; Albendazole; Sheep; Bioavailability; efficacy

P25 SPECTROSCOPIC DETERMINATION OF COBALT AND COPPER IN GRASS PASTURES IN KABETE.

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A study was conducted to determine trace element status of grass pastures commonly grazed by the local community of Kabete, Kenya. Five different species of pasture grasses as identified by the local community and the livestock keepers were collected and voucher specimens deposited at the university of Nairobi herbarium, Upper Kabete campus. This species are: kikuyu grass, rhodes grass, star grass, red oats and napier grass. All the

samples were extracted using wet oxidation and trace elements quantified by atomic absorption spectrophotometry. None of the samples collected was observed to have copper levels above or below the normal recommended values (10mg/kg). None of the grass pastures studied was observed to contain cobalt levels above the normal recommended levels(4.2mg/kg) but 45% of all the samples analyzed contained cobalt levels that were below the normal recommended values for optimum livestock production.

These results suggest that there is a need to include cobalt as a supplement in the feeding regimen of ruminant livestock in Kabete, Kenya.

Key words: Spectroscopy; Cobalt; Copper; Forages; Ruminants; Kabete

P26 COMPARATIVE PROFITABILITY OF PORK BUTCHER BUSINESSES IN WESTERN KENYA

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Objective: The purpose was to determine the profitability of pig butcher enterprises selling cooked and raw pork from butcher shops in two districts of Western Kenya.

Materials and methods: Butchers from two sublocations of each of Busia (16) and Kakamega (14) districts were included. Face-to-face interviews were used to determine the highest and lowest price each butcher would pay for a 30kg pig and to describe the input costs of their businesses. Median weight of 6-10 month old pigs in the area was 30kg. Student's t-tests were used to compare expenses, profits and pigs sold/week by butcher category. Profits were calculated using butcher's high and low pig and pork prices as follows; Profit=dressed weight*price/kg pork-(short run expenses/pig). Dressed weight=22.5kg (0.75*30) assuming all pork was sold.

Results: Short run expenses included employee costs (185Ksh±90.84), meat inspection (Ksh 73±27.7), slaughter slab (Ksh 89±24.8), transporting pig to slaughter (Ksh 101±41.9), wood (Ksh 51±28.22), water (Ksh 30±21.7), soap (Ksh 13±9.4) and salt (Ksh 9±3.3). Others included monthly rent (Ksh 1057±708.9), yearly scale inspection (Ksh 1367±775.1), license (Ksh 2782±793.6), personnel (Ksh 653±277.4) and purchase (repair) of scale (Ksh 3083±2875). Butchers from Busia (13/16) were 10.9 times more likely to sell cooked pork than butchers from Kakamega (4/14; p=0.004). Butchers selling cooked pork sold more pigs/week (5.1±1.4) than those selling only raw pork (3.6±1.6; p=0.03). Short run expenses were higher for butchers selling cooked pork (Ksh 497±72.2) than those selling raw pork (Ksh 442±133.9; p=0.02). The lowest pig price (2097Ksh±429.7) and subsequent high profit (346Ksh±558.3) resulted in negative profits for 9 butchers.

Conclusion: The prices butchers pay for pigs were quite variable and could exceed potential pork revenue. Short run costs equal approximately 3kg of pork. The highest possible pig price can be determined by subtracting 3kg from dressed weight and then multiplying the remaining kg by pork price. Costs incurred by different butchers also varied.

P27 KIDNEY FAILURE DUE TO UTERINE STUMP PYOMETRA IN A FIVE YEAR OLD FEMALE CROSS BREED DOG

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There has been an increased awareness and appreciation of the benefits of having a pet especially the dog. This has seen the veterinary practitioner in Kenya presented with more cases of elective ovariohysterectomy commonly known as spay. This is a permanent surgical contraceptive method for female dogs. However, this routine surgical procedure has also caused a concomitant increase in ovariohysterectomy complications. Uterine stump pyometra is one of these rare complications and is described as an infection of the uterine body tissue after an incomplete ovariohysterectomy procedure. Typically, there is also a portion of the ovarian tissue also present. Diagnosis of uterine stump pyometra is challenging as pyometra is often ruled out especially if the spay operation was carried out several years before presentation. The following case report highlights this challenge. A 5-year-old female cross-breed dog was presented to the University of Nairobi Small animal Clinic with a history of sudden onset of lethargy, anorexia and polydipsia. An ovariohysterectomy had been performed 3 years prior to the presentation. Clinical examination revealed the dog to be dehydrated with severe congestion of the sclera and conjunctiva blood vessels. Hematology and biochemistry analysis showed a leucocytosis with a left shift and elevated blood urea nitrogen and creatinine values. A left lateral abdominal radiograph revealed an enlarged left kidney and a soft tissue radio opaque mass ventral to the colon. This mass was thought to be an abscess. The tentative diagnosis was Kidney failure due to septicemia. Unfortunately the dog died as she was being stabilized for an exploratory laparotomy. Postmortem examination found both kidneys swollen with diffuse grayish foci of scar tissue on the cortices. There was also brown coloured fluid in a tubular structure that resembled remnant uterine horn tissue. The confirmatory diagnosis was nephritis due to chronic uterine stump infection.

P28 SURFACE WATER CONTAMINATION BY LIVESTOCK IN MIGORI DISTRICT: A CASE FOR ONE HEALTH

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The quality of water in grazing lands is primarily a function of interrelationships between precipitation (interval, duration, and intensity), landscape characteristics, and livestock use. Water quality from grazing lands is impaired when suspended solids (soil particles, organic matter particles), nutrients (nitrogen, phosphorus), bacteria, and pesticides exceed standards for specific uses. Pollutants enter streams and rivers through surface overflow (runoff) as suspended or dissolved materials. In addition, livestock may impact water quality through direct deposition of waste (manure/urine) in water resources especially at watering points.

The study undertook an assessment of the livestock production practices and they affect the environment in general and in particular water resources usage. Water and sediment samples were collected and analysed for pathogenic micro-organisms within the available surface water sources that are used for livestock watering and human domestic use. Livestock keepers in Nyatike and karungu divisions, continuously graze their herds along riparian areas that they consider pasture rich and water them at communal areas without defined user rights

and as such watering points are considered areas open to any user in the locality. The continuous grazing of livestock by free range and communal watering points is a major cause of decline in surface water quality. The microbial contamination of surface water at livestock watering points is attributed to livestock dropping dung in the water source and soil sediments being carried to the surface water.

Pathogenic micro organisms such as fecal coliforms, *Escherichia coli*, *Giardia lamblia*, and *Cryptosporidium parvum* were found in the various water samples collected at different livestock watering points. Fecal coliforms were detected in every water sample from the livestock watering points and it was noted that water pans had the highest count of *Escherichia coli* a factor attributed to the lack of running water. The results of this study indicate that the water from the surface water sources in livestock producing areas in Migori contained concentrations of micro-organisms capable of causing human illness. This calls for the application of one health principles (especially in free range and communal grazing areas) to enhance livestock, human and ecosystem health.

Key words: Livestock production, surface water sources, Pathogenic micro Organisms

P29 BEST PRACTICES IN VALUE CHAIN PROMOTION: EXPERIENCE FOR KENYA BEEF VALUE CHAIN

Joyce Thaiya

The Kenya beef value chain (VC) is characterised by low productivity, inadequate market information, linkages among VC actors, limited value addition technologies and facilities, limited awareness on quality and safety aspects of the products and by-products along the BVC, a weak policy framework, conflicting/duplication of mandates within the public service and lack of partnership between the private and public sectors.

The Programme for Promotion of Private Sector Development in Agriculture undertook the BVC promotion in Kenya

The main interventions were capacity development of slaughterhouse owners on organisational development, animal welfare and food safety, training of flayers in improved flaying techniques for improved hides and skins quality, and for butchers in meat hygiene, bookkeeping, butchery business, live animal and carcass grading, meat cutting and customer relations.

The main outcome was increased meat sales of between 50 and 100% due to increased number of customers and reduction of losses resulting from poor meat cutting techniques with resultant increased income. Skin prices increased by 60% increase due to improved quality and demand by tanners. Skin traders at Kiamaiko slaughterhouses increased from 3 to 11 within 2 years of intervention. Each of the 8 extra traders engaged an average of three employees in their skin stores.

This generated an additional income amounting to Ksh. 50M and an employment of about 60 labour years in less than two years.

The impact included improved livelihood and social economic status of the VC actors.

In conclusion, it is evident that promotion of the BVC created a positive impact in income generation and employment creation and recommend that these interventions be up-scaled throughout the country and government should therefore put in place a clear beef sub-sector development strategy

P30 DROUGHT PREPAREDNESS AND INTERVENTION – THE ROLE OF THE VETERINARIAN

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Introduction

Drought is a long period of dry weather when there is not enough water and pastures for livestock to live on. Droughts are a natural phenomenon and are becoming more frequent and more severe with time. They do impact negatively on livestock production and food security. Ultimately human livelihoods, dignity and general health are severely compromised. Their effects

are more felt in areas where nomadic pastoralism is the way of life (Arid and Semi-Arid Lands).

Veterinary Intervention

There are two major aims of Veterinary intervention;

- Boost animal body wealth so as to make it go through as many days as possible during deprivation.
- Control disease spread.

This involves building body reserves and immunity. It also involves controlling disease spread by migrating animals. Community involvement in disease control should be encouraged rather than restricting livestock movement.

Others aims include;

- Taking care of incidental conditions/diseases e. g. water poisoning, downer syndrome etc.
- Promote resilient species/breeds through good animal husbandry practices.

These involve providing basic veterinary care and herd/flock improvement services.

Ranking

It is also imperative to understand community's ranking of various livestock species, breeds, age groups and sex by importance based on cultural, social, economic and hardiness. This will help determine on how and where to direct the veterinary impetus.

Activities to Carry out

Short term/emergency;

- Endo and ecto parasites control.
- Mineral and vitamins supplementation.
- Vaccinations/ prophylactic treatments.
- Animal Health extensions and trainings.
- Destocking.

Long term;

- Herd improvement services.
- Research and documentation of the interplay between drought and diseases and the various mitigations/coping strategies. This is important for policy formulations.

P31 AN INVESTIGATION ON THE PATHOGENS ASSOCIATED WITH CLINICAL MASTITIS IN DAIRY COWS MANAGED BY THE AMBULATORY SERVICES OF THE FACULTY OF VETERINARY MEDICINE, KABETE

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The purpose of this investigation was to establish the pathogens associated with clinical mastitis in dairy cows. The data used in this investigation was obtained from the laboratory of the large animal clinic of the Faculty of Veterinary Medicine covering a period of 10 years (2000-2009). A total of 1,209 samples were collected from dairy cows with clinical mastitis and cultured for bacterial isolation and drug sensitivity. Out of the 1,209 samples, 940(80.1%) yielded mastitis pathogens while 240 (19.9%) did not yield any organism. Out of the 10 pathogens isolated, Staphylococcus spp.(19.8%), Streptococcus spp.(17.2), and Escherichia coli (11.5%) were the main pathogens. Most of the pathogens were very susceptible to

Gentamycin, Ampicillin, Ampiclox and tetracycline while least susceptible to Streptomycin, Cotrimoxazole and Amoxycylav.

P32 TOXIC POISONING OF PIGS ENCOUNTERED NATURALLY IN SMALLHOLDER FARMS IN NAIROBI AND ITS ENVIRONS

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Eighty four pig carcasses received in Department of Veterinary Pathology and Microbiology between June 2004 and June 2007 were examined for toxic poisoning. Systematic necropsies were conducted and tissues collected and processed for light microscopy. Affected farms were visited to gather epidemiological data. Four of the 84 (4.8%) pigs were diagnosed as pulmonary, neuronal, renal and hepatic poisoning. They emanated from smallholder farms in Nairobi and its environs. The first one was a pig that was found dead with upto 1L of watery fluid in thoracic cavity and microscopically, edema in the interlobular septae and alveoli. A commercial feed kept in a damp store was responsible for the pulmonary poisoning. The second one was a boar that was dull, staggering and head-pressing. At post mortem, fluids were encountered in body cavities and at histopathology, cerebral edema, infiltration of mononuclear cells into meninges and acidophilia of cortical neurons were observed. This chronic salt poisoning occurred in pigs feeding on swill but without water for two weeks. The third one was a pig that was off-feed and trembling. At necropsy, pale kidneys were embedded in thick gelatinous edema. At histopathology, nephrons contained amorphous eosinophilic masses. This renal poisoning occurred in a farm where swill was supplemented with farm weeds especially *Amaranthus* spp. The fourth was a pig that had respiratory distress and cyanosis. Gelatinous edema on gastric serosa adjacent to an edematous gallbladder and enlarged liver, highly friable with dark-red circular areas that at histology showed periacinar necrosis and hemorrhage were observed. This hepatic poisoning affected a farm using self-formulated feeds. Toxic poisonings which are associated with feed and/or managerial practices are some of the causes of pig losses in the area. However, toxicological analyses in addition to above findings would be required to define the diagnosis further.

P33 THE NICHE OF SOCIOLOGY IN THE CLIMATE CHANGE DEBATE

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Since the establishment of the intergovernmental panel on climate change (IPCC) in 1988, the potential impacts of global climate change have captured the attention of the scientific research community and made it to the top of many international policy making agendas. As the human causes and consequences of climate change have become increasingly apparent, social scientists have found themselves called on to contribute to the role of humans in global climate change. Sociologists have been slow to engage vigorously in the topic of global climate change in their research and have often missed out in the international climate change table. This is despite the fact that reports of several governmental and intergovernmental agencies in the world cite human activity as one of, if not the primary driver of global climate change. This paper notes that the impacts of global climate change are unequally distributed across socio-economic groups and geographic space and further responds to the arising question: What can sociologists bring to the study of climate change? Sociological research offers a lens for analyzing these multifacets of factors particularly those of disaggregation including race, gender and economic class and environmental justice. This

paper poses key questions which when answered underpin the context and role of sociology in the climate change discourse and contributions to mitigation.

Key words: climate change, sociology, socio-economic groups, disaggregation, geographical space

P34 SEROPREVALENCE OF PESTE DES PETITS RUMINANTS IN CATTLE CAMEL AND SELECTED WILDLIFE SPECIES IN KENYA

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In this study, an investigation was undertaken to find out whether Peste des petits ruminants (PPR) virus does infect incontact animals apart from its hosts sheep and goats. The number of samples to be tested was determined using the formula $n = Z^2_{\alpha} pq / L^2$ and tested by competitive enzyme linked immunosorbent assay (cELISA).

Two hundred and forty adult cattle samples collected from Turkana and West Pokot districts of Kenya were tested. Adult camel samples were collected from Wajir and Garissa districts of Kenya and 162 samples were tested. Wildlife species; 98 buffalo serum samples were tested collected from Tsavo and Meru national parks, 93 warthog serum samples were tested collected from Garissa district and Meru national park and 9 giraffe serum samples were tested collected from the Tsavo national park. All wildlife animal species were aged 1-3 years. Turkana, West Pokot and Wajir districts were mapped by the DVS to have experienced PPR outbreaks in 2007 and 2008.

In this study, 10 cattle serum samples recorded PPR antibodies on cELISA. This was a 4.2% PPR seroprevalence. Of the 10 cattle, 8 were from Turkana district and 2 from West Pokot. Seven of the 10 positive cattle were females and 3 males. The camel samples recorded a 3.13 % PPR seroprevalence with five animals testing positive out of the tested 160. All the camel serum samples testing positive were collected from Wajir district. The wildlife species serum samples tested negative for PPR antibodies on cELISA.

The occurrence of PPR antibodies in cattle and camel is an indicator that these two species do naturally get infected by the PPR virus without running a clinical disease. This allows for development of sentinel cattle and camel herds in the PPR high risk districts of Kenya to be used for surveillance and indicators of increased virus circulation amongst goat and sheep populations.

Key words: Peste des petits ruminants (PPR), cELISA, seroprevalence

P35 COMMON WATER HYACINTH, EICHHORNIA CRASSIPES: AN INVASIVE PLANT SPECIES THAT HAS WRECKED HAVOC IN LAKE VICTORIA

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Among the 7 species of water hyacinth that belong to the genus Eichhornia, the common hyacinth, *E. crassipes*, is the most invasive. The common hyacinth has one of the greatest multiplying rates of any known plant and its population can double in as few as 6 days, making it one of the world's worst invasive weeds. Although the water hyacinth is native to

South America, it has naturalized a lot in the southern part of the USA. The weed is also found in other tropical and subtropical regions of the world except Europe and Antarctica. *E. crassipes* is believed to have been introduced to Africa over a century ago from the Amazon basin as a pot plant due to its aesthetic beauty. The weed was then introduced later to Congo in the region. The food value of the weed to wildlife has however not been documented. The weed could have entered Lake Victoria from Rwanda via River Kagera.

The rapid proliferation of the water hyacinth that has been exacerbated by emission of untreated industrial and domestic effluents into Lake Victoria has resulted in formation of thick mats of the weed especially in sheltered bays and river mouths of the lake. Areas covered by the water hyacinth have suffered ecological and economical impacts. The thick mats have interfered with light penetration into water, smothered native plant species, reduced levels of oxygen that diffuses into water. Boat transport, fishing as well as other water activities have been affected while the presence of the weed has created an ideal environment for vectors of malaria and schistosomiasis as well as snakes. The habitats created by hyacinth mats have however effectively synergized with the decline of the Nile perch to hasten restoration of some fish species that were in the 1990s under threat of local extinction.

Control of the common water hyacinth once it has spread extensively in a body of water is an expensive process. Control measures are meant to tame or reduce the level of invasion of the weed since it is not easy to eradicate the plant once it has invaded a body of water. Mechanical methods of control using machinery as well as biological ways using a weevil (*Neochetina* species) have been used to control the common water hyacinth in L. Victoria with varying degrees of success. Native plants of the lake including the hippo grass have also played a role in controlling the spread of the water hyacinth.

P36 STUDY OF MASTITIS IN CAMELS IN NORTHEASTERN PROVINCE OF KENYA

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The camel (*Camelus dromedarius*) is the dominant livestock in North Eastern province where it provides sustenance to many people especially during the frequent dry periods when other animals die or are unthrifty. Garissa and Wajir in the arid Northern Kenya hosts about 54% of the national camel herd estimated to number over 1 million. Camel milk from North Eastern Province in Kenya is widely marketed in those areas but is also currently being sold in distant markets in Nairobi and other places. An expanded camel milk market provides an opportunity for increased income that can lead to improved pastoral livelihoods. Most of the milk is collected from individual pastoralists, bulked and then taken by transporters to urban areas. The objective of this study was to determine the bacterial pathogens associated with mastitis in camels in Garissa and Wajir districts of North Eastern province of Kenya. A total of 384 composite raw milk samples destined for the market were collected from the two districts of Garissa and Wajir and several laboratory tests performed that included California mastitis test (CMT), bacterial isolation and identification using various tests. Out of the total milk samples screened for the presence of mastitis by use of CMT, 235 samples (61.20%) were positive for sub-clinical mastitis and their equivalent somatic cell counts (SCC/ML) ranged from 1.5×10^5 to 5×10^6 leukocytes per millilitre of milk. All the milk samples yielded mixed types of bacterial genus on culture. The bacterial microorganisms isolated from these milk samples included *Staphylococcus* species (346 samples = 90.10%), *Micrococcus* species (346 samples = 90.10%), *Streptococcus* species (326 samples = 84.89%), *Bacillus* species (176 samples = 45.83%), *Escherichia coli* (230 samples = 59.90%), *Klebsiella* species (352 samples = 91.67%) and *Enterobacter* species (368 samples = 95.83%). Coagulase positive *Staphylococcus* -CPS (*aureus* and *intermedius*) were isolated from 91 samples (23.70%) while Coagulase negative *Staphylococcus*-CNS (*epidermidis*) was isolated from 255 samples (66.40%). CAMP positive *Streptococcus agalactiae* (Lancefield group B) was isolated from 102 samples (26.56%) while CAMP negative *Streptococcus dysgalactiae* (Lancefield group C), *Streptococcus faecalis* (Lancefield group D) and *Streptococcus uberis* (Non lancefield classified) were isolated from 224 samples (58.33%). The high prevalence recorded for the

three major mastitis causing pathogens (Gram positive cocci – Streptococcus, Staphylococcus and Micrococcus species) which originates from the udder, was attributed to bulking or pooling of different camel milk batches from different animals and producers. However the high prevalence of Enterococci (*Escherichia coli*, *Klebsiella/Enterobacter* species) and *Bacillus* species was attributed to contamination of milk containers from the environment due to the poor hygiene of handling milk along the collection and marketing chain. Results of the present study showed that mastitis is prevalent in dromedary camels of Garrissa and Wajir districts of Northeastern province of Kenya, and Gram-positive cocci were the dominant mastitis pathogens isolated. Bacterial mastitis pathogens also represent a potential threat to humans if the milk is consumed raw, a common practice in most camel keeping communities. Mastitis in camels can be prevented or reduced by improving animal health and udder hygiene. More efforts are needed to improve the general camel udder health by introducing mastitis control program in this region. It is possible to recommend a control program for camel mastitis in this region taking into consideration the use of effective antibiotics therapy during lactation and at drying off; this would be an essential part of such a mastitis control program.

P37 INFLUENCE OF POTATO CULTIVAR, FRYING TEMPERATURE AND STORAGE TIME ON LEVELS OF PEROXIDES AND FREE FATTY ACIDS IN CRISPS MADE FROM FOUR KENYAN POTATO CULTIVARS

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Consumption and demand for potato crisps as snack in Kenya has been tremendously increasing in the past decade. Deep-oil-fried foods such as potato crisps absorbed high level of oil that are not only important nutritionally but also has a marked bearing on the flavour and calories supplied. It is, however, important to note that oils used to process foods such as crisps undergo reactions including thermo-oxidative and hydrolytic alterations which may have profound negative effects to consumers, especially when crisps are taken after long storage duration. This study was designed to determine levels of peroxides and free fatty acids as influenced by cultivar, frying temperatures and storage period in crisps processed from four Kenyan potato cultivars.

Potato tubers were processed into crisps of 1.5 mm thick at frying temperatures of 160, 170 and 180 °C. The crisps were packaged into polythene bags commonly used by Kenyan industries (150 gauges) and stored on the laboratory shelf for a period of 4 months.

The results indicated that frying crisps at elevated temperatures significantly ($P \leq 0.05$) increased the levels of peroxides and acid values in fresh oil from 1.93 to 2.22 meq of oxygen/kg and 0.01 to 0.1 mg KOH/g, respectively. Peroxide values and acid values significantly ($P \leq 0.05$) differed among the cultivars with clone 391691.96 having lower levels of peroxides compared to the rest. There were significant ($P \leq 0.05$) increases in peroxide value and acid value with time of storage in all the cultivars with the exception of clone 391691.96.

The potato cultivar, frying temperature and storage duration are very important determinants on how safe a potato crisp picked from the shelves of market outlets should be. It is therefore, important for all the manufacturers to declare on the labels the frying and required storage conditions including dates of expiry.

Key words: peroxides, acid value, storage

P38 NUTRITIONAL AND ANTIMICROBIAL ACTIVITIES OF TWO SELECTED TERMITOMYCES SPECIES OF MID-WESTERN UGANDA.

Nakalemebe, I.

P39 FISHERIES POLICY AND ITS RELEVANCE TO FOOD SECURITY AND SAFETY.

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In this paper we interrogate the fisheries policy 2008. The approach comprises a walk in the historical transect of the industry, discusses key players, beneficiaries including fisher folks, artisanal large scale and intermediaries against the characteristics of the market segment. Further we examine the content of the policy against timing and of its development. There are key features of the policy documented that espouse the overall national development and key drivers. Subsequently we elucidate the impact of the policy on food security, safety, trade and utilization of the fisheries resources. The role of knowledge management and of technology development as embodied in this policy document is additionally analysed and further developed.

Key words: Fisheries policy, Food security, Food safety and Fishery resources.

P40 FUNCTIONAL GENOMICS OF TSETSE/TRYPANOSOME INTERACTIONS.

Laila, U. A.

P41 MICROARRAY TECHNOLOGY: A ROBUST HIGH THROUGHPUT METHOD OF INVESTIGATING GENE FUNCTION.

Maina, E. N.