

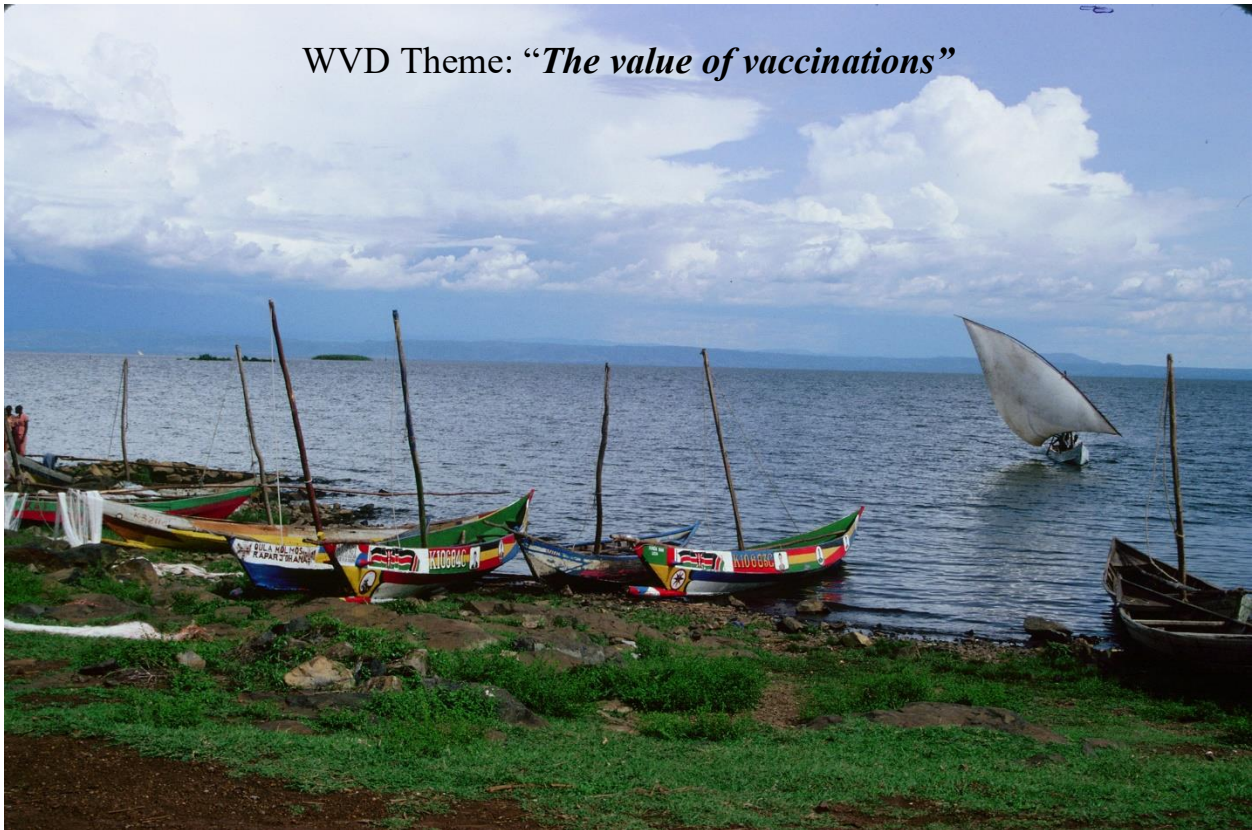


Improving livelihood of Kenyans!

THE KENYA VETERINARY ASSOCIATION 53RD ANNUAL SCIENTIFIC CONFERENCE AND WORLD VETERINARY DAY CELEBRATIONS

AT ACACIA PREMIER HOTEL, KISUMU CITY COUNTY

WVD Theme: *“The value of vaccinations”*



24TH TO 27TH APRIL 2019

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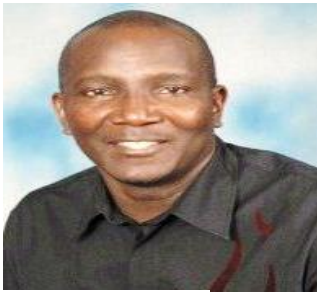
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Director of Veterinary Services

WORD FROM THE CHAIRMAN



DR. KAHARIRI SAMUEL

Welcome to the 53rd KVA annual scientific conference. This conference is one of the main events to mark the World Veterinary Day celebrations in Kenya. World Veterinary Day (WVD) was created in 2000 by the World Veterinary Association and is celebrated annually on the last Saturday of April to recognize the work of veterinarians around the world and their contributions to improve animal health and welfare and public health. This year the theme for the World Veterinary Day is *“the value of Vaccination”*

This conference provides a platform for the stakeholders and all the value chain players to share and learn the new innovations, technological advancements and new research findings that directly or indirectly facilitates the realization of the immense potential held by the livestock sector

The wide range of high quality conference papers crafted around this year’s theme of **“Animal Resource Industry Driving the Sustainable Development Goals”** will be disseminated to the stakeholders in order to fan a speedy transformation and commercialization of the animal resource industry and increase the use of modern innovations and technologies for increased efficiency and productivity.

The dedication and commitment of the National organizing committee and the ground planning team of KVA Nyanza branch and the County government of Kisumu in organizing these events is acknowledged with immense gratitude. The team acknowledges and appreciates support from our esteemed partners and sponsors who played a great role in making this event a success. I take this opportunity to thank all the partners for joining hands towards making livestock sector the single greatest contributor to the country’s GDP. I wish you a memorable conference!

KENYA VETERINARY ASSOCIATION 53RD ANNUAL SCIENTIFIC CONFERENCE AND WORLD VETERINARY DAY		
Theme: <i>Animal resource industry driving the sustainable development goals</i>		
Date: 24th-26th April 2019		Venue: Acacia premier Hotel, Kisumu
Day 1: Wednesday 24th April 2019		
7.00-8.00 am	Registration	KVA Secretariat
8.00- 8.30am	Introductions and welcoming remarks	KVA
Session 1: <i>One Health</i>		Session Chair: Dr A Mwatondo
8.30-8.45am	Prevalence and genetic diversity of Cystic Echinococcosis in livestock in Kajiado west sub county, Kenya	Lucy Gitau
8.45-9.00am	Sero prevalence and associated risk factors of Q fever among camel slaughter house workers and herders in selected counties of Kenya: a cross-sectional study	Dr. Alice Kiyong'a
9.00-9.15am	Value Chain Framework and Public Health Risks in Live Bird Markets, Busia, Kenya, 2018	Dr. Josephat Mbai
9.15-9.30am	Developing an Integrated Surveillance System for Zoonoses in Western Kenya	Dr. Maurice Karani
9.30-9.45am	Cystic echinococcosis and echinococcosus infection in human, livestock, dogs and wildlife in Kenya	Dr. Peter B. Gathura
9.45-10.00am	Description of Human Brucellosis Cases at Lodwar County Referral Hospital (LCRH), Turkana County-Kenya, 2014 -2017	Dr. Erenius Nakadio
10.00 -10.15am	<i>Plenary discussion</i>	All
10.15-10.45am	Tea Break	All
Session 2: <i>Legal and Policy Framework in the Animal Resource Industry</i>		Session Chair: Dr Wanga
10.45-11.05am	Keynote address 1: "Show us the money". How can we improve resource allocation to animal health through data?	Dr. Lian Thomas
11.05-11.20am	Effects of devolution on the provision of veterinary services in Kenyan Counties	Dr. Allan Ogendo

11.20-11.35am	Veterinary Education in Africa: Present and Future Outlook.	Prof. Charles Muleke Inyagwa
11.35-11.50am	Livestock Identification and Traceability legal framework	Dr. T. Manga
11.50-12.10pm	Key note address 2: Strategic Role of Veterinarians in food security and the overall attainment of the big four agenda.	Dr. Wanga Christopher
12.10-12.25pm	Plenary discussion	All
12.25-1.00pm	Opening ceremony Guest of Honour Hon. Mwangi Kiunjuri, Cabinet Secretary MoALFI	KVA Chairman
1.00-2.00pm	Lunch	All
<i>Session 3: Animal Welfare and Contribution to Improved Livelihoods of the Communities.</i>		Session Chair: Tennyson W.
2.00-2.15pm	Assessment of farmers compliance to implement cow comfort changes	Emily Kathambi
2.15-2.30pm	A programme to including animal welfare in academic education and continuous professional development of veterinarians and para-veterinarians worldwide	Dr. Solomon Onyango
2.30-2.45pm	Using email marketing and social media to build animal welfare movement in Kenya	Lucy Wanjiku
2.45-3.00pm	Engaging slaughterhouse workers in conversations on animal welfare, food hygiene, and public health	Dr. Nicholas Bor
3.00-3.15pm	Competency-based animal health monitoring framework: Brooke East Africa case study	Dr. James Kithuka
3.15-3.30pm	A study on donkey use and contributions to welfare and livelihoods of communities	Dr. Simon Topisia
3.30-3.45pm	A survey of donkey trade and slaughter practices in Kenya; A case of Narok County	Dr. Joseph Mugachia
3.45-4.00pm	Biosecurity and disease risk in donkey skin trade on a global perspective	Mr. Getachew Mulugeta
4.00-5.30pm	Panel Discussion	Moderator- Dr Mugachia

	Introductory talk - Impact of Donkey Slaughter for skin trade to smallholder farmers livelihoods in Kenya	<u>Sam Theuri</u>
	Panel -Interrogation of donkey Slaughter in Kenya	Panelists: CS/PS/DVS/KVB/ADWOK/ Donkey Value Chain actor/ Donkey Sanctuary
5.30-6.00pm	Tea Break	All
Day 2: Thursday 25th April 2019		
7.00-8.00 am	Registration	
Session 4: <i>Antimicrobial Resistance and One Health</i>		Session Chair Dr. S Kiambi
8.00-8.30am	Keynote address: In sickness and in Health: Enhancing livestock and human relations	Sam Thumbi
8.30-8.45am	Prevalence of bovine mastitis in Nandi County of Kenya: risk factors and antibiotic sensitivity of the causative bacteria	Dr. Peter Ndirangu
8.45-9.00am	Determination of Antimicrobial Susceptibility Profile for Staphylococcus aureus Isolated from Bovine Milk samples with Clinical Mastitis in Nyeri, Kirinyaga and Murang'a Counties, 2016-2018	Dr. Bernard Chege
9.00-9.15am	Antimicrobial Resistance in Bacterial Poultry Pathogens in Kenya: A Review	Dr. Jared Serem
9.15-9.30am	AMR and sensitivity on microbes causing mastitis in cattle at coast region in samples analysed in RVIL Mariakani Kenya 2005 - 2018	Dr. Ibrahim Kariuki
9.30-9.45am	A cross sectional study to generate baseline data on the patterns, quantities and trends in the use of Veterinary Medical Products in Kenya	Dr. Naphtal Mwanziki
9.45-10.00am	Increasing Incomes For Smallholder Dairy Farmers Through Enhancing Milk Safety And Quality In Kajiado North Sub County, Kajiado County-Kenya(A Change Project).	Dr. Nazaria Nyaga
10.00-10.15am	Plenary discussion	All
10.15-10.45am	TEA BREAK & POSTER PRESENTATION	
Session 5: <i>Animal Health and One Health</i>		Session Chair: Dr. J Jalangó

10.45-11.00am	Outbreak Detection of Rift Valley Fever in Livestock Using Enhanced Syndromic Surveillance in Kenya, May – July 2018	Dr. Omolo Jack
11.00-11.15am	Factors associated with the injuries inflicted to workers in slaughterhouses and meat processing plants in Nairobi, Kenya	Dr. Purity Nguhiu
11.15-11.30am	Seroprevalence of leptospirosis in slaughter pigs; a neglected public health risk, Busia County, Kenya 2019.	Dr. Jeremiah Ngugi
11.30-11.45am	Verification of a shortened protocol for prioCHECK FMDV NS ELISA	Peninah Muiruri
11.45am-12.00	Economic Loss Estimates from Bovine Organ and Carcass condemnation at Malindi Slaughter House	Dr. Godrick Mwaringa
12.00-12.15pm	Enhanced Syndromic Surveillance for early detection of Rift Valley Fever outbreak in Marsabit Kenya May - July 2018	Dr. Boku Bodha
12.15-12.30pm	A situation analysis of prophylactic health products usage in livestock and aquaculture in Kenya	Dr. Rezin Odede
12.30-12.45pm	Efficacy Of Selected Anti-Mange Agents Against Natural Mite Infestations Of Rabbits In Central Kenya	Dr. Kennedy Ogolla
12.45-1.00pm	Mutual recognition agreement for veterinary practitioners within the East African community member states	Dr. Idraph Ragwa
1.00-1.15pm	Plenary discussion	All
1.15-2.15pm	LUNCH & POSTER PRESENTATION	All
2.15-4.30pm	KVA Annual General Meeting	KVA members
4.30-5.00 pm	TEA BREAK	All
Day 3: Friday 26th April 2019		
7.00-8.15 am	Registration	
Session 6: <i>Contribution of Livestock to Food Security and Agribusiness</i>		Prof. George Owiti
8.15-8.45am	Keynote Address: Exploiting livestock to gain food security and transforming lives of the communities in the Country	Dr Wamahiu

8.45-9.00am	Infertility In Dairy Cattle In Selected Parts Of Kenya	Dr. John Mugambi
9.00-9.15am	A cross-sectional study on infertility in dairy cattle in selected counties of Kenya	Dr. Moses Olum
9.15-9.30am	Investigating the socioeconomics of foot and mouth disease	Dr. Polly Compston
9.30-9.45am	Exploring economics of large scale broiler production systems in Kenya	Dr. Joshua Onono
9.45-10.00am	Effects of <i>Calliandra</i> and <i>Sesbania</i> supplementation on daily milk production in dairy cattle on commercial smallholder farms in Kenya	Dr. Dennis Makau
10.00-10.15am	Plenary Discussion	All
10.15-10.45am	TEA BREAK	All
Session 7: <i>Companion Animals Management</i>		Dr.Mwikali Mugachia
10.45 - 11.00am	Pet owner factors affecting small animal welfare (dogs and cats) with regards to veterinary care in Nairobi	Dr. Ambrose Kipyegon
11.00-11.15am	The incidence, age, breed predisposition and types of fractures in household dogs in Nairobi County Kenya	Dr. Kipyego Serem
11.15-11.30am	Hematological Effects of Ketofol in Acepromazine or Medetomidine Sedated Dogs	Dr. Moses Wamaitha
11.30am-11.45am	Clinical diagnosis and Management of pleural effusion in a 2-year-old entire Male German Shepherd dog: A Case report	Dr. Lilyan Mathai
11.45-12.00	The assessment of learning and proficiency of imaging modalities in undergraduate students of the University of Nairobi taking Bachelor's in Veterinary Medicine.	Ms.Specioza Chirchir
12.00-12.15pm	Plenary Discussion	All
Session 8: <i>Animal Health</i>		Session Chair: Dr. ElizabethOuko
12.15-12.30pm	Antigenic structure of bovine leukemia virus components and their importance in the diagnosis of bovine leucosis	Dr. Jakait Juliet
12.30-12.45pm	Risk mapping of milk contamination by antimicrobial residues in Githunguri Sub-County, Kiambu County	Dr Obiero David

12.45-1.00pm	Common livestock diseases syndromes reported through the Kenya livestock wildlife syndromic surveillance, Bomet County, 2018.	Dr. Benard Njau
1.00-1.15pm	Distribution and genetic diversity of <i>Echinococcus granulosus</i> in western Kenya	Dr. Titus Mutwiri
1.15-1.30pm	Plenary Discussion	All
1.30-2.30pm	LUNCH	All
Session 9: <i>Wildlife Health and management</i>		Session Chair: Dr Francis Gakuya
2.30-2.45pm	Community structure and host association of ticks parasitizing wild animals in Kenya	Dr. Edward Kariuki
2.45-3.00pm	Unusual mortalities of the eastern black rhinoceros (<i>Diceros bicornis michaeli</i>) due to clostridial enterotoxaemia in Ol Jogi Pyramid Sanctuary, Kenya	Dr. David Ndeereh
3.00-3.15pm	Canine distemper outbreak in wild and domestic carnivores in Laikipia ecosystem of Kenya	Dr. Mathew Mutinda
3.15-3.30pm	Experiences And Challenges In Managing Orphaned/Abandoned Elephants In An Elephant Sanctuary In Northern Kenya	Dr. Stephen Chege
3.30-3.45pm	Review of the effects of Pyric Herbivory and pasture quality and quantity in a savanna ecosystem.	Dr. Phillis Masudi
3.45-4.15pm	Plenary Discussion	All
4.15-4.45pm	Closing Ceremony. Guest of Honour - Hon. Harry Kimtai, PS SDL	KVA Chairman
7.00-12:00 noon	Cocktail	All
4.45-5.15 pm	TEA BREAK	All
SCIENTIFIC POSTERS		
Heat treatment of the blood serum samples as a method of increasing the sensitivity of Elisa test in the diagnosis of bovine leucosis		Dr. Jakait Juliet
Assessment of farmers' compliance to implement cow comfort changes		Dr. Emily Kathambi
The HORN Project: The One Health Regional Network For the HORN of Africa		Dr. Victoria Kyallo
DAY 4: Saturday 27th April 2019		

8.00-9.00am	Procession	All
9.00-12.00am	Vaccinations, treatments, exhibitions and guests tour the sites	Vet. volunteers and partners
11:30-1:00pm	Public Baraza	Guests and the public
	Departure	

SCIENTIFIC ABSTRACTS AND PRESENTATIONS

Prevalence and Genetic Diversity of Cystic Echinococcosis in Livestock in Kajiado West

Sub County, Kenya

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Background: Cystic Echinococcosis (CE) is a widespread neglected zoonotic disease across the world. The infection is caused by the dog tapeworm *Echinococcus granulosus sensu lato* and in Kenya, it is common in livestock rearing areas such as Kajiado County in the southern part of the country. However, the prevalence and circulating species/strains remain unknown.

The aim of this study was to determine the prevalence and genetic diversity of CE in livestock in Kajiado West Sub-county.

Methodology: A total of 1,486 livestock (388 cattle, 625 sheep and 473 goats) were examined for presence of hydatid cysts or lesions in various organs during meat inspection between December 2016 and February 2017. Protoscolices or tissue material were picked under the microscope with a micropipette and lysed in 10 µl of 0.02 M NaOH at 99 °C and the lysate used as template in a nested polymerase chain reaction of NADH dehydrogenase sub unit 1 (nad1). Genotyping was done by restriction fragment length polymorphism or sequencing. The data was statistically analyzed using SPSS Version 20. A p-value of <0.05 was considered statistically significant.

Results: The prevalence of CE was 15.2% (72/473) in goats, 14.9% (93/625) in sheep and 14.2% (55/388) in cattle). Out of the total 421 cysts that were characterized, 337(80%) were (*E. granulosus sensu stricto* s. s., 21(5%) *E. canadensis* (G6/7), 7 (1.7%) *E. ortleppi* (G5) and 56(13.3%) could not be determined.

Conclusion: This study confirms that *E. granulosus* s. s. is still the dominant species in livestock in Kajiado as reported earlier and elsewhere in Maasailand. There was a slight increase of CE prevalence in goats, reduction in those of cattle and sheep compared to previous studies.

Keywords: Cysts, Echinococcosis, Livestock, Kajiado.

Sero Prevalence And Associated Risk Factors Of Q - Fever Among Camel Slaughter House Workers And Herders In Selected Counties Of Kenya: A Cross-Sectional Study

Alice Kiyong'a¹, Velma Kivali¹, Maurice Karani¹, Eric Fèvre^{1,2}, Elizabeth Cook¹

1. International Livestock Research Institute
2. University of Liverpool

Q-Fever is a zoonotic disease caused by *Coxiella burnetii* with the potential of causing sporadic and epidemic disease. The purpose of this study was to estimate the sero prevalence and associated risk factors of Q-Fever among camel slaughterhouse workers and herders aged above 18 years in Isiolo, Laikipia and Machakos Counties, Kenya. There is no previously published research in this area from Kenya., although antibodies to *C. burnetii* have been detected in camels suggesting the potential for zoonotic transmission.

This was a cross sectional study including 111 slaughterhouse workers and herders. Questionnaire data and blood samples were collected from consenting participants. Sera samples were screened with a commercial indirect ELISA for antibodies to *C. burnetii*. Non-parametric Fisher's exact test was performed to measure the strength of the relationship between risk factors and seropositivity.

Three (8.1%) herders and 3 (4.6%) slaughterhouse workers tested positive for Q-Fever. The estimated prevalence of Q-Fever from all the three Counties was 5.9% (95% CI 2.8%-12.4%). There were no risk factors identified as significantly associated with Q Fever seropositivity. Although there was a positive relationship with drinking raw blood (OR 1.72; 95% CI 0.18-16.23) and eating raw meat (OR 1.72; 95% CI 0.18-16.23). This study was limited by the small sample size; however, Q Fever does not appear to be a significant occupational hazard to camel keepers or slaughterhouse workers in Kenya.

Key words: Occupational, Q-Fever, sero prevalence

Value Chain Framework and Public Health Risks in Live Bird Markets, Busia, Kenya, 2018

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¹Field Epidemiology Training Program, Kenya

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Introduction: Live bird markets (LBMs) are important outlets for trade in poultry. The LBMs have changed the traditional transmission dynamics of infectious diseases to play a prominent node in poultry zoonoses. Few studies have investigated the LBM-associated pathogens to explain LBMs' role in disease epidemiology. We aimed to identify elements in LBMs value chain for the risk of zoonotic *Campylobacter*.

Methods: Using multi-stage cluster sampling, we selected LBMs and enrolled all live poultry traders (LPTs) for the study. Using interviewer-administered questionnaire, we collected information on LPTs socio-demographics, flock-structure, biosecurity and risk perceptions on zoonotic *campylobacter*. A set of six Likert-scale type questions on transmission pathways were used to measure zoonotic risk. Presumed positive-cultures of cloacal samples from one bird/flock/ LPT were tested for *Campylobacter* through conventional PCR. Data was entered, cleaned and analyzed in Epi-info. Those who agreed with the risk pathways were awarded a score of “one” and “zero” for disagreement. A score \geq median categorized respondents as low risk and vice-versa as high risk. We calculated descriptive statistics, odds ratios (OR) at bivariate and logistic regression at 95% confidence interval (C.I) to compare socio-demographics, biosecurity and risk status to identify elements associated with zoonotic risk.

Results: We enrolled 14 LBMs and 186 LPTs; mean age 46.5 ± 13.7 years; 162 (87.1%) males. Markets had 13 LPTs (IQR 8 – 17); Further, 58.6% LPTs separated poultry species and 146 (78.5%) traded backyard poultry. Seventy-two (38.9%) practised onsite-slaughter while 66 (35.5%) accessed hand washing facilities. Fifty-four (29%) LPTs identified risk pathways while *Campylobacter* positivity was 43/112 (38.4%). Accumulation of litter; aOR, 7.18 (95% C.I, 1.81– 28.44) was associated with zoonotic risk while access to hand-wash facilities significantly reduced the risk; aOR, 0.38 (95% C.I, 0.19 – 0.75).

Conclusion: Sanitary conditions in LBMs contribute to zoonotic risk. Biosecurity interventions that cost effectively improve hygiene and LBMs profitability are recommended.

Keywords: Poultry, Live bird market, *Campylobacter*, Biosecurity, Kenya

Developing an Integrated Surveillance System for Zoonoses in Western Kenya

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Keywords: One Health, zoonoses, public health, veterinary public health, livestock markets, slaughterhouses, hospital patients, Kenya

Surveillance of diseases in Kenya is currently carried out by both human and animal health sectors. However, a recent evaluation highlighted the lack of integration between these sectors, leading to disease under-reporting and inefficiencies. This project aimed to develop an integrated and cost-effective surveillance and reporting system for fifteen zoonotic diseases piloted in the counties of Bungoma, Busia and Kakamega in western Kenya.

Interviews were carried out with key informants, and this was followed by field visits to identify sentinel sites and liaise with relevant stakeholders. Based on this information, a sampling strategy comprising 12 sentinel sites, 4 in each county, was developed. Each sentinel site comprised of a livestock market, 1-2 neighbouring slaughter houses/slabs, and a hospital in the vicinity; each site was visited every 4 weeks for 24 cycles. At each site, animal or patient sampling included a clinical examination and collection of blood, faeces and nasal swabs; in animals, mesenteric lymph nodes, hydatid cysts, flukes and external parasites were also collected. At the end of each field visit, data on staff involved and challenges encountered were recorded, while biological samples were processed and tested for 15 zoonotic diseases in the field laboratory in Busia, Kenya. Regular public engagement sessions were held at the various

sentinel sites to share preliminary results and provide feedback to both stakeholders and study participants.

A livestock market visit lasted approximately three hours, and the most common challenge was the frequent refusals of animal owners to participate in the study. At the slaughterhouses, visits lasted around four hours, and challenges included poorly engaged meat inspectors or slaughter processes that were too quick for sampling. Finally, the hospital visits lasted approximately five hours, and the most frequent challenges included low patients turn-out, frequent staff turn-over leading to poor institutional memory, and difficulty in obtaining patient stool samples.

Our experiences so far have highlighted the importance of engaging with local stakeholders in the field, while also providing timely feedback through regular public engagement sessions, to ensure on-going compliance.

Cystic echinococcosis and echinococcosus infection in human, livestock, dogs and wildlife in Kenya

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Introduction: Echinococcosis is a cyclo-zoonotic disease of worldwide distribution. It is caused by various species of taenidae parasite of the genus *Echinococcus*. The studies reported here aimed at establishing the presence of cystic Echinococcosis and *Echinococcus* infection in Human, Livestock, Dogs and Wildlife in Kenya.

Methodology: Slaughterhouse surveys were used to establish the prevalence of *Echinococcus granulosus* cyst in cattle, sheep, goats, camels and donkeys. Faecal sample assays were carried out to determine the presence of *E-granulosus* in dogs and wild carnivores. Ultra-sound scanning was used to check for the presence of cysts in human while post-mortem was carried out in wilder beasts dying when crossing the Mara River. The study sites were Turkana, Samburu, Laikipia, Isiolo, Meru, Tharaka Nthi, Kajiado and Narok counties.

Results: Ultra-sound scanning in human indicated a prevalence of 2.0% in Turkana, 0.7% in Narok South and 0.2% in Isiolo. Slaughterhouse surveys showed a prevalence rate of 56.4% in cattle, 11.4% in sheep, 12.4% in goats and 72.8% in camels in Turkana County. In microscopic examination of faecal samples infection rates of 9.2% were obtained in Turkana, 5.2% in Samburu, 4.0% in Masai Mara, 0.7% in Isiolo and 0.5% in Laikipia counties. Prevalence rates of 8.1% in lion faecal samples, 0.9% in leopard and 2.3% in spotted hyena.

Conclusion: Cystic Echinococcosis and Echinococcus infections are still rampant in Kenya livestock, dogs and other carnivores. Only a few counties were covered in the reported surveys and there is need to carry out larger surveys to map out the distribution of the disease in the country. This will enable policy makers to institute well informed control measures.

Key words: Echinococcosis, Kenya, prevalence

Description of Human Brucellosis Cases at Lodwar County Referral Hospital (LCRH), Turkana County-Kenya, 2014 -2017

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Introduction: *Brucellosis* is of major economic importance and remains of public health significance worldwide. Information regarding the burden of *Brucellosis* in the county is scanty. The study objective was to describe burden of human *Brucellosis* cases at Lodwar County referral hospital from 2014 to 2017 and recommend appropriate preventive and control measures.

Methodology: We conducted a retrospective review of data as reported in the Ministry of Health (MOH) 204A, MOH 204B and MOH 240C registers from 2014 to 2017. Variables collected and analyzed were residence (Ward, Village), age, sex, date seen at the facility, clinical syndromes (fever), mode of diagnosis, mode of treatment, outcome and Laboratory results. Data were collected and entered into Ms Excel spreadsheets and checked for data quality and consistency. Continuous variables were analyzed using measures of central tendency and dispersion and a 2x2 table was used to assess measures of association. Data was presented in tables and graphs.

Results: Data of 1268 records of human brucellosis cases were reviewed. The mean age was 33.9 years with a standard deviation of +/-14.7. The age group and sex most affected was 21-40 years (39.75%) and female (66.88%) respectively. More cases were reported in Lodwar township ward (85.17 %) and in 2017(51.89). Of the 1268 records, 721(60.33%) were positive. The female sex had a prevalence odds ratio (POR) 1.3208 (95% CI 1.0338-1.6875) and predictive value (PV) of 0.013 while over 5 years had POR of 7.6759 (95% CI 0.8939-65.9111) and P Value of 0.021. Data quality and consistency was poor.

Conclusion: The burden of human brucellosis is high. The Female sex and old age were the likely factors associated with disease. Enhanced public health education will allow effective preventive and control measures to be implemented and might decrease burden of brucellosis in the county.

Key words: Human Brucellosis, Turkana

Effects of Devolution on The Provision of Veterinary Services in Kenyan Counties

Author: Dr. Allan Ogendo

Introduction: Kenya promulgated a new Constitution in 2010 with the aim of bringing substantive governance closer to Kenyans throughout its 47 Counties. The constitution defined the devolution of various services, including veterinary services (VSs). The aim of this study was to explore the level of satisfaction among animal health practitioners on VSs before and after devolution.

Methodology: Questionnaires were administered during the Kenya Veterinary Association (KVA) western branch CPD workshop held on 15th March 2018 in Busia County, and to veterinarians attending the KVA annual scientific conference held on 25th April 2018 in Nyeri County. A five-point Likert scale was used to assess the level of satisfaction of animal health practitioners on veterinary service delivery, human resource, and budgetary allocation before and after devolution. Quantitative and qualitative data analyses were performed using SPSS and NVivo, respectively.

Results: In total, 103 participants responded to the questionnaire. Of these, 63.1% were from western Kenya, while 36.9% were from 16/47 (34.0%) counties in Kenya. Most respondents were government employed (67.0%) with more than 10 years (68.9%) working experience. Of the respondents, 11.9%, 22.6%, 33.1%, 19.0% and 13.4% were totally satisfied, slightly satisfied, moderately satisfied, slightly dissatisfied and totally dissatisfied with VSs before devolution while after devolution the level of satisfaction was 10.3%, 14.3%, 14.8%, 18.2%, and 42.4% respectively. Respondents were most dissatisfied with animal identification, timely disbursement of funds and staff promotions. Some of the priority areas identified were: more budgetary allocation to VSs at County level, reduce resource disbursement times, provision of adequate staff and capacity building.

Conclusion: Devolution of veterinary services presents great challenges evident from the considerable level of dissatisfaction among animal health practitioners, particularly with regards

to animal identification, timely disbursement of funds and staff promotions. However, this also presents great opportunities if the identified areas are prioritized by the County governments.

Key words: Devolution; Kenya; County; Veterinary Service

Veterinary Education in Africa: Present and Future Outlook.

Author: Prof. Charles Muleke Inyagwa

In a rapidly changing world, veterinary education is facing new challenges and is continually evolving to meet societal demands in the field of prevention and control of diseases food security, food safety, public health and animal welfare. Appropriate education and training have a direct effect on the quality and performance of public and private components of veterinary services. Well-educated public and private veterinarians who have received appropriate training will help the country to fulfill its national and global mission: improve animal health worldwide. Veterinary education commenced in South Africa in 1920 at the Onderstepoort Veterinary Institute in South Africa, now the University of Pretoria. Today there are over 46 veterinary training institutions in Africa of which 21 are in sub-Saharan Africa. Quality veterinary education and research with adequate numbers of qualified veterinarians are essential to satisfy the sustainable development goals, the objectives of African Union, and the agreements regulating international trade. A brief history of the veterinary education, present trends in veterinary education and the future outlook of veterinary training and initiatives applicable to Africa are described in this paper.

Key Words: veterinary education, Africa, training institutions.

Development of Kenya Livestock Identification and Traceability Systems (LITS) Legal Framework

Author: Dr. Thomas Manga

The development and implementation of Livestock Identification and Traceability Systems (LITS) is a critical facet of animal health management, certification for trade, quality and safety assurance for animal products, the securitization of livestock assets and control of cattle rustling.

The implementation, administration and governance of LITS require legal frameworks to for the effective regulation and enforcement. Currently, livestock identification in Kenya is conducted under Cap 357 of the Stock Branding Act and Legal Notice No. 167 of 2017. Whereas Cap 357 makes provisions limited only to the hot iron branding of cattle, L. N. No. 167 provides for the use of electronic devices as legal tools in animal identification.

In view of rapid technological changes in LITS technologies and requirements for trade globally, it was deemed necessary to develop a comprehensive legal framework to address the governance and enforcement of LITS. The draft livestock identification, registration and traceability system regulations (2019) provide for the establishment of the Kenya Livestock Identification, Registration and Traceability System and the establishment of a central database. The regulations outline standards for identification devices and their application on animals including setting requirements to be met by suppliers of identification devices. Under the regulations, the roles of County Directors of Veterinary Services in maintaining and updating a register of animals are stipulated.

The regulations make provision for livestock product traceability. An enforcement framework is inbuilt through stipulated requirements for a registrar and inspectors and details penalties for persons in default.

Assessment of Farmers' Compliance To Implement Cow Comfort Changes Recommended, And Their Effects on Lying Time, Stall And Cow Cleanliness On Smallholder Dairy Farms in Kenya

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Our study aimed to evaluate farmers' compliance in implementing farm-specific cow comfort changes recommended, and the effects of the change on lying time, stall cleanliness (1-5) and cow cleanliness (1-5) using a randomized controlled trial carried out on 73 smallholder dairy farms in Kenya. The intervention group had 62 farms (n=90 cows) and the control group had 11 farms (n=16 cows).

On all the farms, data loggers were attached on the cows to determine lying time, and questionnaires administered to collect baseline data on the first visit. Three days later, recommendations were given to the intervention group farmers orally and in written form and data loggers removed from all cows. After 39 ± 7 days, data loggers were again attached on cows on all the farms, compliance assessed and a post-intervention questionnaire administered to intervention group farmers. Three days later data loggers were removed from all cows.

Data were analysed on Stata 14.2® with proportions describing the farmers' compliance to implement proposed changes while medians and ranges were described the cow lying time and cleanliness scores. Proportion tests and Kruskal-Willis rank test were used to compare cleanliness scores and lying time respectively, within and between groups, over the assessment time. Univariable and multivariable mixed logistic regression models evaluated factors associated with compliance. Interaction effects between treatment groups and visits were assessed using multivariable mixed linear and logistic regression models of the natural log of lying time and cleanliness scores respectively.

The farmers' overall compliance was 74% (46/62). The odds of compliance were higher when: major changes were recommended relative to minor changes (OR=6.3, $p=0.004$); and changes recommended were related to floor characteristics (floor softness and flatness) in comparison to changes related to stall design ($p=0.047$). The odds of compliance were lower in: farms where the farm-hands received the recommendations compared to farms that had the wife receive the recommendations (OR=0.01, $p=0.023$); and farms that had proposed changes related to roof, alley and sharps fixes relative to stall design fixes (OR=0.1, $p=0.004$). The farm effects explained about 84.4% of the variation observed in compliance. For farms that implemented at least one recommended change (46 farms), the odds of compliance were lower if: the farmers reported at least one recommendation was hard to implement (OR=0.3, $p=0.021$); if the recipients of the recommendations were men (OR=0.4, $p=0.037$) or farm hands (OR=0.1, $p=0.016$) compared to women receiving recommendations. Post-intervention, stall, udder and upper hind leg cleanliness scores improved significantly ($p<0.0001$, $p=0.021$ and $p=0.017$ respectively) in the intervention farms but remained relatively similar in the control farms.

Giving farm-specific cow comfort recommendations to smallholder dairy farmers in Kenya and providing them with a participatory role in the formulation and implementation of improvement recommendations ensured good acceptance and a high degree of implementation and led to a subsequent improvement in their welfare in terms of cow comfort and cleanliness.

Keywords: dairy cows, compliance, cow comfort

A Programme to Including Animal Welfare in Academic Education and Continuous Professional Development of Veterinarians and Para-Veterinarians Worldwide

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This presentation aims to highlight the activities carried out by the WTS VETS UNITED programme to address these challenges through education hence providing opportunity for other organizations to learn from the success realized and challenges to be overcome.

The results of a survey done in 2014 by VETS UNITED among 44 countries globally indicated that there is limited inclusion of animal welfare topics in the teaching curriculum of veterinary training institutions. 48% of the responders stated that Animal Welfare was not part of the curriculum at all.

To support local universities, colleges and training centers in the process of including animal welfare in their curricula the program VETS UNITED was developed in 2015.

The programme supplies practical based veterinary knowledge and field training for people who work or train to work in the field of animal health and welfare. An initial analysis is done in collaboration with a partner organization either an NGO, veterinary clinic, government agency or university to identify key areas of concern to be addressed. Goal is to ensure that participants learn exactly what they will need for their daily work.

VETS UNITED offers professional and financial support until the local partners can run the programme self-sufficient. VETS UNITED is currently active in The Gambia, Malawi, Tanzania, Uganda and Liberia.

In conclusion, our experience has shown that, the training is needed and helps address the competency gaps identified by the professionals and farmers in the field.

Key words: animal welfare, education

Using Email Marketing and Social Media to Build Animal Welfare Movement in Africa.

Author: Lucy Wanjiku

Over the years, use of internet in Africa has grown exponentially. More than half of the population has access to the internet either through the personal computer or through the mobile telephone.

World Animal Protection has leveraged the use of internet to educate, inform and rally masses to support animal welfare. Being a relatively new topic in Africa, animal welfare discourse is often a hard to sell topic; amidst poverty, disease, politics and education or lack of thereof. As a global office with, an Africa wide mandate World Animal Protection in Africa, has leveraged multiple channels to reach out and rally people to support for animal welfare.

We started with a small group of young people 20 – 15 who had a good social media profile-good following and sound monolithic topic on their profile. The young people profiles were pro-development and often described themselves as social activists. There are the social policemen often tweeting about women issues, calling out corrupted leaders. There are the change makers.

We organized, monthly tweeter conferences which we later renamed ‘Tweeter barazas’. During these meetings we had guest speakers mainly drawn from World Animal Protection fraternity and later expanded to our partners. The topics ranged from the most basic – what is animal welfare, what are animal freedoms, what is an animal. The young people took notes, they tweeted and broadcast to the world the day’s topic. We have treaded on most cases, our database has grown, we have built a solidarity of 15,000 strong email subscribers who are well attuned and passionate about animals. The word is out there spreading and bettering the lives of animals one key board at a time.

Engaging Slaughterhouse Workers In Conversations On Animal Welfare, Food Hygiene, And Public Health

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Topic: Animal Welfare and Contribution to Improved Livelihood of the Communities

Keywords: humane slaughter, focus group discussions, public engagement, stakeholders

During our current surveillance activities in western Kenya, we regularly visit ruminant slaughterhouses and pig slabs in the area. These visits have allowed us to appreciate the many challenges they face, which in turn impede implementation of recommended best-practices. In particular, we have observed poor animal welfare practices, which may lead to psychological stress in the workers and productivity losses due to carcass condemnations. We therefore plan to engage relevant actors and stakeholders in conversations on animal welfare, food hygiene, and public health in the slaughterhouse context. This information can then be leveraged to improve the health and welfare of both slaughterhouse workers, and the animals they work with.

In the coming weeks, separate focus group discussions shall be conducted with County veterinary officers, sub-County veterinary officers, and meat inspectors in western Kenya. These discussions shall allow us to explore issues related to governance, challenges, actors, and activities involved in slaughterhouse work. We shall then conduct workshops with slaughterhouse workers to better understand their daily work and the challenges they face. Information garnered during these sessions shall be used to develop culturally appropriate and contextually relevant information material on recommended slaughterhouse and welfare practices. This educational toolkit shall be used to educate and address attitudes and behaviors during training sessions organized specifically for these slaughterhouse workers. Outputs from this work shall also be shared with relevant Kenyan national authorities, to ensure that our work can be relevant to the greater community.

Through such combined and concerted efforts we hope to inspire changes and drive improvements in slaughterhouses. This, in turn, will contribute to improved livelihood of the communities through better health and increased carcass profitability.

Competency-based animal health Service Provision mentoring framework: Brooke East Africa case study

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Competency-based animal health mentoring framework is an approach modelled after competency-based veterinary education framework which is designed to equip professionals by confirming their ability to meet the needs of the animal and the expectation of the society. The

competency-based animal health framework consists of four domains of competencies, each representing a group of related abilities necessary for veterinary graduates.

Brooke Hospital for Animals has a vision for good animal welfare, meaning a good life experience with regards to the animal's nutrition, behaviour, health, environment and mental welfare. Quality animal healthcare system contributes towards a vision for better welfare. Clinical competency levels vary within animal health care system. However, there are several gaps including low quality of service delivery which impact negatively on welfare of animal, healthcare practitioners' business and user confidence in services. Ensuring that a healthcare infrastructure includes competent Animal Health Practitioners (AHP) improves animal welfare and benefits the local economy to which livestock, including working equids, contribute. A competent AHP is one that uses evidence-based veterinary medicine in a manner that promotes animal welfare. The Brooke competency-based animal health system mentoring framework outlines the essential competencies to be used when attending cases in the field; it defines the expected clinical quality while attending animal health needs in low income communities.

The framework is a form of work-based assessment which acts to help bridge skill and resources gaps by identifying individual AHP skill level using a multi-competency framework and allows case-based mentoring to occur as part of the process. The framework is based on Brooke Veterinary Competency framework and requires that AHP is an advocate of animal welfare; an effective communicator; an excellent practitioner with an ability to recognise their own clinical limitations and to refer cases to their support network where necessary; able to demonstrate good clinical governance. The four areas provide a base to build good practice using evidence of non-negotiable actions. The process provides a platform for effective personalised mentoring in the field, or within a training institution, and encourages reflection by the mentee during and after the process. The data collected can also be used as part of clinical quality monitoring by looking at areas of weakness demonstrated across all AHPs so these can be address more generally. The framework also identifies animal healthcare system gaps such as unavailability of pain relief. Evidence from the framework can be used for improvements in animal healthcare education and systems.

Using this framework Brooke East Africa carried a baseline survey with 87 AHPs where 35 were unsatisfactory (scored less than 50%); 14 required improvement (scored 51 – 69%); 35 were good (scored 70 – 89%) and only 3 were outstanding (scored over 90%). The results further indicated that 41 (44%) of AHP are offering services fully accepted by the society with only 31%; 32% and 35% of AHPs performing well in Clinical governance, Animal welfare advocate

and kit content respectively. Record keeping is the worst performed parameter with only 22% of AHPs keeping clinical records and just 24% AHPs have kits that contain essential medicines especially pain relief medicines.

Conclusion: Improving training and mentoring of animal health practitioners during training and post qualification leads to competent and confident animal health practitioners

Key word: animal health practitioner; competency framework; Animal Health Care Framework; Animal Welfare

A Study On Donkey Use and Contributions to Welfare and Livelihoods of Communities

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Donkeys are silent helpers to their owners and many a time the input by donkeys goes unnoticed. In a bid to highlight the donkeys' contribution, focus group discussions involving 120 donkey owners were conducted among donkey owning communities living in urban, semiarid and high potential areas of Kenya. The study covered Kiambu, Nairobi, Meru, Kirinyaga, Tharaka Nithi, Machakos, Embu and Nyandarua Counties. From the information collected 80% of the donkey owners transport goods by cart while the 20% transport goods by pack. The majority of donkeys are used to provide commercial transport.

The contribution of donkeys to the livelihoods of donkey owners is significant owing to the profits acquired from the transport business. All participants have earned money from working donkeys which they saved in groups and with the bank. The proceeds from the donkey transport business have been used to meet the basic needs in the households including paying for school fees. Approximately 35% of the participants have invested the earned income from donkey use to start businesses, buy assets such as land and construct rental houses which have further contributed to their household income. Women benefited most from the donkey business through the increased household income and savings. Consequently, household conflicts reduced.

From the discussions, participants acknowledged setting aside a portion of their earnings to cater to their donkey's needs. They achieved this by buying feeds and supplements, providing veterinary care, secure shelters and good harnessing equipment for their donkeys to cushion them from wounds and discomfort while working.

The information acquired will be used to design programs which will support both donkey owning households and their donkeys. It will also help address gaps and issues identified during the study, to build positive change in knowledge, attitudes, behaviour and practices that affect working donkeys in the study areas.

Keywords: Donkeys, Income, livelihoods

A Survey Of Donkey Trade And Slaughter Practices In Kenya; A Case Of Narok County

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The impact of the donkey trade and slaughter process on donkey welfare remains hazy in Kenya. Utilizing household questionnaires, key informant interviews, focus group discussions and observation; this study identifies areas of the donkey trade and slaughter process that need improvement in order to conform to donkey welfare best practices and raise the issues of concern with a view to motivating stakeholders to institute corrective interventions and help in improving the welfare of donkeys involved in the trade and slaughter process.

Majority at 84% (326/388) of the respondents indicated that there were no donkey welfare provisions at the slaughterhouse holding pens while 71.3% (276/388) said the same for holding pens at the donkey market. Majority (87.3%-339/388) transported donkeys to the market on foot while 11.6% (45/388) had transported by truck. Half of the respondents (50.3%-195/388) said a donkey is normally given first aid if it gets too sick to travel during transportation contrary to 17% (66/388) who said the donkey is forced to continue with the journey.

Challenges and health concerns experienced when transporting donkeys alone on foot ranged from death of donkey (29%-557/1940) to self-mutilation and kick injuries at 35%(674/1940). In contrast, transporting donkeys alone by vehicle presented challenges ranging from bite wounds and donkey death at 10% (186/1940) each to loading difficulties at 15% (297/1940). A great number 97% (376/388) had never experienced or participated in donkey slaughter while 2.3% (10/388) reported that donkeys were restrained manually and the throat cut. Most respondents at

76% (1469/1940) indicated that increased donkey buying price and value, enhanced veterinary services 71% (1386/1940) and donkey farming to increase donkey numbers at 68% (1318/1940) would enhance donkey welfare directly and indirectly.

The study concluded donkey welfare was grossly violated in transportation of the donkey, at the market collection points and in illegal slaughter and theft. Therefore, there is need for intervention in the welfare of the donkey in the slaughter and trade process especially at the likely areas of donkey welfare violation. Kenyan Government needs to rethink on donkey slaughter policy to avoid extinction of donkeys as a species in Kenya.

Keywords: welfare provisions, donkey slaughter methods, transportation, donkey farming, donkey trade process

Biosecurity and Disease Risks of Donkey Skin Trade: A global perspective

Author: Mr. Getachew Mulugeta

Donkeys comprise more than 39% of the over 116 million world equine population. Over 97% of the world's donkey population is found in developing countries, providing agricultural and transport energy, and in many cases the sole means of generating income for their resource-limited communities, and hence playing a significant role in Sustainable Development Goals.

Besides being a beast of burden, donkeys have become very popular for their milk and meat production. Their milk for nutritional, therapeutic and cosmetic purposes is a rapidly growing business. Donkey meat is also becoming a common foodstuff in many countries around the world. Nowadays donkeys have become extremely popular for their skin, and global donkey skin trade has become a pandemic because of the increased demand for making Ejiao, a traditional Chinese medicine, claimed to have anti-aging properties and a cure for a wide range of diseases and disorders.

A recent study by the Donkey Sanctuary and many anonymous reports have revealed that millions of donkeys are slaughtered annually either legally or illegally for their skin. Donkeys are indiscriminately transported to slaughterhouses for long distances in countries or across

borders irrespective of their health status and without food, water and veterinary care. Such uncontrolled mass movement of donkeys can undoubtedly play a significant role in the spread of deadly infectious diseases, such as AHS, Equine influenza, Glanders, Strangles or Trypanosomosis.

Many legally established donkey slaughterhouses in many developing countries are not well regulated and monitored, and has no biosecurity measures in place. The situation is even more complicated by the increased illegal trade where hundreds of donkeys are poached and killed every day in remote areas just for their skin leaving carcasses to rot.

Apart from the attached welfare issues, and endangering the world donkey population and the livelihoods of millions of resource-limited donkey-dependent communities, the role of the trade plays on disease transmission and spread, and on environmental pollution and contamination could be immense.

This presentation/paper addresses the biosecurity and disease risks posed by the global donkey skin trade, and the epidemiological and zoonotic roles donkeys can play in diseases transmission and spread.

Key words: Donkeys, skin, trade, biosecurity, disease, risk.

Impacts of Donkey Slaughter for Skin Trade on Small Holder Farmers Livelihoods

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Recognizing that donkeys have not been traditionally farmed for the food industry, the introduction of slaughter in a value chain that is not properly organized is a disruption of concern. The extraction of skin for the traditional Chinese medicine has not addresses the sustainability of the donkey animal nor has it considered the impact to the resource poor farmers who depend on the animal for livelihood support and survival particularly due to its association with criminal aspects of donkey theft and illegal bush slaughter. The current benefits and excitement of the donkey skin trade are only limited to a short run period.

Following consistent high rates of donkey slaughter for skin trade that has catalyzed donkey theft for illegal slaughter, Brooke sought to evidence the determinants and socio-economic effects of donkey trade in (2017) and further on the effects of trade in donkey skins on the livelihoods of smallholder farmers (2019). From a study conducted in Narok, Nakuru and Baringo in 2017, it was, found that owners whose donkey was stolen become poorer (77.7%), reduced income for

women (19.2%), increased labour for women (35.6%), children missing school (15.8%), loss of source of transport (29.1%), and other reasons (11.6%). The findings of the 2018 study conducted in Kitui, Kirinyaga, Nyandarua, Narok and Bungoma Counties, showed that the short term exploitation is exciting some families and merchants for the quick cash but hurting small farmers in the long run. This is due to the easy availability of markets places and buyers. The trade has also provided avenues for disposing old, sickly and injured. However, smallholder farmers who have sold or had their donkey(s) stolen strain the remaining donkeys and even combine donkeys with oxen to plough or to transport commodities. Buying a donkey is now more expensive and farmers now have to use expensive alternatives such boda boda or trucks to transport farm inputs or farm produce. Women and children bear the greatest burden in undertaking transport and household transport using their backs impacting on their health and development. Persons with disability and the elderly who have lost their herds have suffered the highest burden in their dependency level. The reduction of donkey populations' means the available donkeys are overworked leading to welfare issues. The rates of insecurity among donkey owners have increased and have been influenced by the rapid growth in the donkey trade and diminishing supply of donkeys.

In conclusion, there is nothing small about 'small holder farmers'. The contribution they can make toward helping achieve the UN global goal SDG1: No Poverty, SDG2: Zero Hunger, SDG5: Gender Equality, SDG6: Clean Water and Sanitation, SDG13: Climate Action, SDG15: Life on Land of Zero Hunger by 2030 and the BIG FOUR AGENDA. Donkeys are key assets critical in agriculture powering and facilitating food production and distribution. Donkey skin trade is hurting them in the long run.

Brooke is supporting owner-led protection initiatives to improve security and safety for those animals at risk of the illegal trade and we are advocating with partners in national, regional and international fora to ensure that where such legal trade exists, it is properly regulated, ensure that minimum animal welfare standards are met and further advocate for limiting and eventually eliminating the export trade for donkey hides. We support the veterinary profession to ensure compliance to welfare standards along the slaughter value chain and ensure that smallholder farmers have access to quality and affordable services access and resources to safeguard and guarantee animal health and welfare

Prevalence Of Bovine Mastitis In Nandi County Of Kenya: Risk Factors And Antibiotic Sensitivity Of The Causative Bacteria

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A study was carried out to investigate prevalence of mastitis, associated risk factors, bacterial etiological agents and their antibiotic sensitivity profiles among cattle in Nandi County of Kenya. A total of 129 lactating cows were randomly selected from 51 farms and risk factors determined by administering 51 questionnaires to farmers. Clinical mastitis was diagnosed by physical examination of cow udders for swelling, hardening and pain as well as gross observation of milk for changes in consistency and colour. California Mastitis Test (CMT) was used to detect sub-clinical mastitis (SCM). Mastitis causing bacteria were identified by culturing 106 udder quarter milk samples obtained from quarters with clinical and SCM. Antibiotic sensitivities of the causative bacteria were investigated by subjecting 12 staphylococcus and 4 streptococcus isolates to an array of 8 antibiotics using Kirb-Bauer disc diffusion method. Clinical and SCM had a cow level prevalence of 4% (5/129) and 41% (53/129) respectively. The disease burden was high among cows under semi-zero grazing system and where there was poor milking hygiene. Additionally, mastitis was most prevalent in old cows (parity of 3-5) and at mid-lactation (>3-9 months). Most of isolated bacteria were gram-positive cocci (in clusters or chains) at 72.9% (51/70), followed by gram-negative cocci 15.7% (11/70) and gram-positive rods 11.4% (8/70). Biochemical tests identified five bacterial genera majority 44.3% (31/70) being *Staphylococcus species*, followed by *Streptococcus species* 28.6% (20/70), *Escherichia coli* (*E. coli*) 11.4% (8/70), *Bacillus species* 7.1% (5/70), *Corynebacterium bovis* and other coliforms at 4.3% (3/70) each. Staphylococci (n=12) had 100% sensitivity to gentamycin, kanamycin, streptomycin and chloramphenicol, but were least (16.7%) sensitive to sulphamethoxazole. Streptococci (n=4) had 100% sensitivity to gentamycin, kanamycin, tetracycline and chloramphenicol, but 100% resistance against sulphamethoxazole. Thus, gentamycin, kanamycin, streptomycin, tetracycline and chloramphenicol are drugs of choice for treatment of mastitis in Nandi County. However, antibiotic susceptibility testing is important for the other antibiotics in order to prevent their indiscriminate use and guard against development

of antimicrobial resistance. Additionally, good mastitis management practices such as good milking hygiene, milking infected cows last and having a towel for each milking cow needs to be embraced to reduce mastitis burden in the area.

Key words: Antibiotic susceptibility, Bacteria, California Mastitis Test, Clinical Mastitis, Sub-clinical mastitis

Antimicrobial Susceptibility Profiles for *Staphylococcus aureus* Isolated from Milk samples of Clinically Mastitic cows in Nyeri, Kirinyaga and Murang'a Counties, 2016-2018

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Introduction: Food borne diseases are of infectious or toxic nature transmitted by contaminated food or water. The most common infectious causes of food borne outbreaks are bacteria; they cause disease through tissue invasion or toxin production. *Staphylococcus aureus* is responsible for most food poisoning cases; the organism produces preformed toxins in food. It is a common causative agent for bovine mastitis, causing direct milk contamination. This study aims at identifying *staphylococcus aureus* isolates in milk samples submitted at Regional Veterinary Investigation Laboratory, Karatina from Kirinyaga, Nyeri and Murang'a Counties, describe seasonal trends and antimicrobial susceptibility.

Methods: This study was conducted by review of records of passive laboratory based surveillance on isolation, identification and antimicrobial susceptibility for *staphylococcus aureus* isolates from milk samples of bovine with clinical mastitis submitted to regional veterinary investigation laboratory Karatina from Nyeri, Murang'a and Kirinyaga Counties for the period between January 2016 and December 2018.

Data was entered and cleaned in Ms. Excel 97-2003 worksheet. Epi Info 7 TM was used to analyze categorical data for proportions and antibiotic susceptibility for *Staphylococcus aureus* while Ms. Excel 97-2003 workbook was used to analyze numerical data for descriptive statistics and seasonal trends.

Results: A total of 456 records were included for analysis. *Staphylococcus aureus* distribution was Kirinyaga (83.3%), Nyeri (83.9%) and Murang'a (83.1%). Seasonal distribution was; January-March 92(20.2%), April-June 136(29.8%), July-August 79(17.3%) and September-December 149(32.7%). *Staphylococcus aureus* was sensitive to Gentamicin (94.3%), Tetracycline (74.6%), Chloramphenicol (68.6%) and Kanamycin (64.9%). The isolate were resistant to Ampicillin (68.2%), Sulphamethoxazole (64.9%) and Cotrimoxazole (62.5%).

Conclusion: *Staphylococcus aureus* was the predominant isolate with increasing occurrence during wet seasons without variation by county. There was resistance to antibiotics commonly administered as oral preparations compared to parenteral ones. Continuous surveillance to monitor antimicrobial susceptibility patterns to guide empirical use of antimicrobials is recommended.

Key words: Antibiotic susceptibility, *Staphylococcus aureus*, Food poisoning, Bovine mastitis

Antimicrobial Resistance in Bacterial Poultry Pathogens in Kenya: A Review

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The objective of this paper is to review available information on poultry bacterial pathogens and antimicrobial resistance in Kenya so as to suggest possible interventions. This is because although numerous studies have been conducted on AMR and poultry in Kenya, this information has not been synthesized to make it easy for utilization by the end user. With increased intensification and poor housing conditions, high disease incidences are often encountered in poultry production. To mitigate this, more than 70% of farmers include antibiotics in feed and water for prophylaxis without consulting a vet. This has been associated with high antibiotic residues in meat and eggs exceeding WHO acceptable levels. It also presents risk of antimicrobial resistance. Review findings revealed prevalence of the pathogenic organisms in poultry to be: *E.coli*, 44%, *Streptococcus*, 40.7%, *Campylobacter jejuni*, 34%, *Staphylococcus*, 26.2%, *Campylobacter coli*, 18.7%. *Salmonella*, 12%, *Bacillus*, 9.3% and *Proteus*, 2.9%. Tetracyclines are the most commonly used medicines in poultry at 76%, Ampicillin 71%, Sulphamethoxazole 69.5%, Clotrimazole 65.5%. *E.coli* has one of the the highest resistance to

antibiotics for example, resistance to Tetracyclines was at 75.9%, Clotrimazole, 72.4%, Ampicillin, 39%, Ciprofloxacin, 19% and Chloramphenicol, 13.2%. *Campylobacter* multidrug resistance stood at 61.3% and specifically 71% resistance to Tetracycline, 71% Ciprofloxacin, 25.8% to both Gentamycin and Chloramphenicol. *Salmonella* resistance; 94% against Nalidixic acid, Amoxicillin, 89%, Tetracycline, 61%, Clotrimazole 56% and Streptomycin, 23%, but nonresistant to Gentamycin, Chloramphenicol and Ciprofloxacin. It implies that, antimicrobial resistance in poultry seems high and need alternatives to keep birds healthy to minimize antibiotic treatments is key to tackling the problem.

Key words: Antibiotics, Bacterial pathogens, Chicken

Antimicrobial Resistance and Sensitivity on Microbes causing Mastitis in Cattle at Coast region in Samples analysed in RVIL Mariakani, Kenya 2005-2018

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Introduction: Mastitis is the inflammation of the mammary gland or udder. Often, it result from micro-organisms (bacteria, mycoplasma, yeast, algae), introduced during milking process or from environment, physical injury or chemical irritation. Mastitis can be clinical or sub-clinical. Clinical signs that manifest through the udder include; swelling, hardness, redness, pain on palpation, watery, flakes, clots and pus in milk. In Kenya, management of mastitis has major economic and public health implications due to widespread injudicious use of antimicrobials and the resultant antimicrobial resistance (AMR). The objective of the data review was to describe the AMR and sensitivity of the microbes to common antimicrobials used in mastitis management in cattle and the distribution of Mastitis cases in Kenyan coastal region.

Methods: We reviewed mastitis case records from Regional Veterinary Investigation Laboratory (RVIL) in Mariakani for the period 2005 through 2018. A data abstraction was developed and used in the review. A case was defined as a record of any milk sample from cattle diagnosed with mastitis clinically and laboratory confirmed. We described the source farms, the etiologies, the antimicrobial resistance and sensitivity of the bacteria. Data were managed and analysed

using MS Excel and Epi Info version 7. Descriptive statistics were reported using tables and figures.

Results: A total of 263 records of cultured milk samples were reviewed. Large scale farms accounted for 113(63.1%) of the sources of samples. Among the counties, Kilifi submitted 277(58%) of samples. Pathogens were isolated from 250(87.4%) of the samples, 36(12.6%) of the samples were not well collected or stored. Common etiological agents isolated included; *E.coli* (32%) and *Staphylococcus* spp (29%). *Bacillus subtilis* demonstrated the highest Antimicrobial Resistance 11(36.62%) against Ampicillin followed by *Pasteurella* spp 7(35%), *Pseudomonas* spp 11 (28.9%) *E.coli* with 28(25.7%), *Klebsiella* 10(25%) *Staphylococcus* 23(6.9%). Sulphamethoxazole: *E.coli* showed the highest resistance at 37(33.9%), followed by *Pseudomonas* spp 10(26.3%), *Pasteurella* spp 5(25%). and *Streptococcus* spp 8(21.62). Cotrimazole: *E.Coli* showed the highest resistance against Cotrimazole at 32(29.4%). *E.coli* demonstrated no resistance against Tetracyclines, Gentamycin and Chloramphenicol.

On antimicrobial sensitivity: Gentamycin: *E.coli* showed a high sensitivity at 56(17.6%), *Streptococcus* 8(19.5%), *Pseudomonas* 12(21.4%) and *Klebsiella* 9(18.2%). Chloramphenicol: *E.coli* sensitivity was at 56(17%), *Streptococcus* spp 7(17.1%), *Pasteurella* spp 7(29.2%). Kanamycin: *E.coli* sensitivity was at 54(17.0%) Tetracyclines: *E.Coli* 55(17.3%) and *Pasteurella* spp 6(25%)

Conclusion: The enhanced surveillance on antimicrobial resistance should be emphasized throughout the year for controlled of antimicrobial misuse.

Keywords: Mastitis, Kenya, Antimicrobial Resistance, Antimicrobial Sensitivity

A Cross Sectional Study to Generate Baseline Data on the Patterns, Quantity and Trends in the Use of Veterinary Medicinal Products in Kenya.

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The overarching mandate of the Veterinary Medicine Directorate (VMD) is to attest that Veterinary Medicinal Products (VMP) that are locally manufactured, imported, exported and

distributed in the country meet the highest standards of safety, efficacy and quality. This serves to ensure animal health and welfare as well protection of public health and the environment. However, a proper regulatory framework is one that is based on evidence and anchored on reliable data. Unfortunately, data on the VMPs in use in Kenya has been lacking. This makes it hard for VMD to effectively undertake its mandate.

A cross sectional study was carried out at the end of 2017 to generate baseline data on the patterns, quantity and types of VMPs used in the country. Through the Food and Agriculture Organisation (FAO) of the United Nations, supported by the Fleming fund the study sought to establish the source, type, quantity and distribution channels of VMPs in Kenya. The types and quantities (in kilograms) of the active ingredients of target VMPs imported and distributed in the country was recorded. The sampled population included VMPs supply chain actors, composed of importers/wholesalers, feed millers, retailers, private animal health practitioners and farmers located in the five counties of Kajiado, Kiambu, Marsabit, Nairobi and Nakuru. A total of 355 respondents were sampled during the study. Of these, 143 were retailers, 139 were farmers, 46 were private practitioners, 14 were VMPs importers and 13 were livestock feed millers.

The Knowledge, Attitude and Practices (KAP) on Antimicrobial Use (AMU) and Antimicrobial Resistance (AMR) was assessed at retail, private practitioners and farmer levels. The study also documented regulation compliance barriers and other operational challenges at each level of the VMPs supply chain.

The study established that the most common port of entry for VMPs was Mombasa (98%) followed by Jomo Kenyatta International Airport (JKIA) at 2%. It also revealed that 17 out of the 30 registered VMPs importers requested to import 25 types of products in 2017. The total quantity in Kilograms (Kgs) of all VMPs imported was 589,098 kgs, stratified into 53% (313,447 Kgs) antimicrobials, 43% (255,963 Kgs) ectoparasiticides, 3% (16,402 Kgs) antihelminthics and 1% (3,286 Kgs) antiprotozoals. Tetracyclines with 199,568 Kgs were the highest quantity of antimicrobial class imported in 2017. Other classes included Salinomycin (62,310 Kgs), Aminoglycosides (24,761 Kgs) and Penicillins (18,334) Kgs. It was established that only four types of ectoparasiticides were imported in 2017. These included Organophosphates (188,300Kgs); Amitraz (80,297 Kgs), Pyrethroids (31,096 Kgs) and Carbamates (18,700 Kgs).

The main anthelmintic classes imported in 2017 were oral benzimidazoles mainly albendazole (7,499 Kgs), Salicylanilides mainly closantel (4,051 Kgs) and Levamisole (3,949 Kgs). Ivermectin (898 Kgs) alone or in combination with closantel was the main injectable anthelmintic product imported. Diminazene aceturate- Berenil (1,299 Kgs) was the main antiprotozoal product imported.

The main challenge encountered by the VMP importers was the bureaucratic procedures due to the many national and county level government regulatory agencies, and the high cost of obtaining GMP certification.

Majority (125) of the 143 veterinary medicine retail outlets sampled were agrovet enterprises mainly owned by animal health certificate holders (68).

Assessment of AMR knowledge at retailer's level indicated that just under half (46%) of the respondents were knowledgeable on matters AMR.

The findings of this study are an important first step in efforts to put in place policies and regulatory measures to ensure that VMPs being used in Kenya are safe efficacious and of acceptable quality. The actions taken will be informed by evidence that these findings and subsequent other studies will reveal.

Increasing Incomes for Smallholder Dairy Farmers Through Enhancing Milk Safety And Quality In Kajiado North Sub County, Kajiado County-Kenya. (A Change Project)

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The dairy sector contributes significantly to SDGs 1(No poverty), 2(Zero hunger), and 3(Good health). Milk production's enormous potential in economic development and food security in rural areas makes dairy an important subsector in Sub Saharan Africa (FAO (2016)). Despite the huge opportunities, the sector faces a number of challenges.

Of the total milk produced, about 60% is marketed through traders, cooperatives, hotels and kiosks with an estimated 84% of the milk produced being sold in raw form to consumers. Wanting dairy farming practices and a fragmented dairy sector poses a major challenge to food safety assurance to the milk consumers.

Kajiado County is one of the 47 counties of Kenya. Kajiado North that practices dairy has approximately 128,163 dairy cattle producing 682,844 litres of milk annually. Presently there are three active dairy cooperatives: Oloolaiser, Enchoroemuny and Tradairy (Kiserian)

The objective was to support the farmers of Kajiado North subcounty to improve their dairy returns.

Methodology was in four phases; Planning phase, design phase, delivery phase and evaluation phase.

100 farmers were trained in 6 villages, 3 sops were designed and adopted in 3 coops and 2 parameters identified for premium, penalty program.

Significant findings: Males participants were more in all trainings, farmers were aware of zoonotic diseases associated with milk. Withdrawal periods were recognized but not drug specific. Reaching out via cooperatives and the village to village approach was a successful strategy as was collaboration with industry players. Farmers were not familiar with rapid mastitis farm tests.

Reception to new knowledge by farmers was noted as was inclination to business. Increased productivity as well as reference to safety and quality in trainings would be adopted. None of the coops had sops and premium/penalty programmes.

Key words: Kajiado, good dairy farming practices, standard operating procedures, premium/penalty

Outbreak Detection of Rift Valley Fever in Livestock Using Enhanced Syndromic Surveillance in Kenya, May – July 2018

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Background: Rift Valley Fever (RVF) is endemic in Kenya, with epizootics occurring every 10-15 years associated with above normal rainfall levels, flooding, and mosquito population increase. Kenya meteorological department predicted rainfall above normal levels in 2018. RVF syndromic surveillance was initiated to collect data on livestock syndromes and identify environmental factors associated with RVF for early outbreak detection in livestock.

Methods: Toll free telephone line was shared with veterinary officers/farmers nationally to report livestock syndromes of abortion, death, and bleeding. Additionally, we identified 20 RVF high risk counties where veterinary reporters recruited 20 livestock-owning households that were contacted weekly during May–July 2018 for reports on livestock syndromes (abortion, death, bleeding), flooding and self-reported increase in mosquito population. A suspect household (SHH) was one reporting flooding, mosquito increase and any syndrome. Specimens collected were submitted to central veterinary laboratories for RVF testing. We identified environmental factors associated with counties confirming RVF in livestock compared to counties not confirming RVF calculating odds ratios (OR) and 95% confidence intervals (CI).

Results: Livestock syndromes was reported by 31/47 (66%) counties, 19/31 (61%) were RVF high risk counties. Among 6,068 complete reports from 1,257 households in RVF high risk counties, 182 (14.4%) were SHHs from 19 of 20 counties. Of 115/1257 (9.1%) households reported livestock deaths, 96/1257 (7.6%) abortions, 34 (2.7%) bleeding, 702 (55.8%) reported increases mosquito populations and 329 (26.1%) reported flooding. Total of 3,870 samples were tested for RVF; 84 (2.2%) and 360 (9.3%) were positive by PCR and IgM ELISA, respectively. RVF in livestock was confirmed in 23/31(74%) counties. Mosquito increase (aOR 2.1, 95% CI 1.74-2.50) and flooding (aOR = 1.3, 95% CI 1.08-1.53) were significantly associated with being a county confirming RVF.

Conclusion: Livestock syndromic surveillance system worked for early detection of RVF cases and provided information that can be used for targeted response.

Key words: Kenya, Rift valley fever, syndromic surveillance

Factors Associated with the Injuries Inflicted to Workers In Slaughterhouses and Meat Processing Plants in Nairobi, Kenya

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Background: Slaughterhouse facilities and meat processing plants are known to pose significant threats to worker's safety and health due to the hazardous conditions involving animals, tools and dangerous machines used in the meat industry.

Objective: To investigate the types of injuries and associated factors experienced by workers in slaughterhouses and meat processing plants in the study area since the extent of this has an impact on the safety of the employees.

Methodology: A total of 347 respondents were included in this study out of an estimated population of 2206 workers in slaughterhouses and meat processing plants in the study area. Information was obtained using structured questionnaires, Key informant Interviews and focused group discussions. *Result:* The types of injuries inflicted to these workers included wounds/superficial injuries (57.3%), bone fracture (7.5%), concussion, internal injury, burn, scald or frost bite (4.0%), poisoning, infection and suffocation (4.0%) and other types (8.0%). Demographic factors had a significant influence on injury rates and so was the category of a slaughterhouse and processing plant.

The level of implementation of Occupational Health and Safety Act (OSHA, 2007) determined the injury rates in these facilities. Overall, workers in Nairobi experienced very high injury rates (21.9 per 100 full-time workers).

Conclusion: Demographic factors had an influence on incidence of injuries and the category of slaughterhouses and processing plants which again was closely linked with the level of compliance to OSHA, 2007.

Key words: Injuries, slaughterhouses, workers.

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Seroprevalence Of Leptospirosis In Slaughter Pigs; A Neglected Public Health Risk, Busia County, Kenya 2019.

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Introduction: Leptospirosis is a neglected zoonosis of public health importance. Transmission is through contact (directly or indirectly) with contaminated soil, water or urine of infected animals. In pigs the disease characterized by abortion, still births and weak piglets. In humans, the disease manifests as mild asymptomatic infection or a severe disease (Weil's syndrome). Slaughterhouse workers are occupationally exposed and at high risk of infection.

Methods: A cross-sectional seroprevalence study was conducted in May to July 2018. Serum was tested for anti-leptospiral antibodies using micro-agglutination tests (MAT) and kidney tissues tested for leptospiral DNA by PCR. Sera was considered positive for seroreactivity with a MAT titre $\geq 1:40$ against at least one serovar. Questionnaire and observational checklist was used to illicit information on animal demographics and practices of slaughterhouse workers. Descriptive statistics and prevalence were calculated.

Results: A total 252 serum and 240 kidney tissue samples from 7 slaughterhouses were tested by MAT and PCR respectively. Of the 252 pigs sampled, 88.8% were local breeds and 55.6% were female. Eighty three (32.9%) samples tested positive on MAT against at least one of the 8 serovars on MAT panel. Highest prevalence recorded for serovar Lora 21.4%, Kenya 5.2%, Sokoine 3.6% and Grippytyphosa at 3.2%. On PCR, 112 (46.6%) samples were positive for leptospira DNA. Highest seroprevalence was recorded in Matayos (32%) and Nambale (31%) sub counties. Mundika and Nambale slaughterhouses had positive tests for at least 5 serovars. A total of 197 (79.7%) of the pigs originated from farms with other types of livestock and this was positively associated with a pig being positive OR 2.3 (95% CI 1.0 – 4.9). Risky practices by

slaughterhouse workers included use of improper footwear at 54%, cooking/eating at the slaughter house 51% and not washing hands with soap 93%.

Conclusion; High prevalence of leptospirosis and poor hygiene practices occupationally exposes the slaughterhouse workers to leptospirosis.

Key words: Leptospirosis, occupational exposure, slaughterhouse workers, micro-agglutination test.

Verification of a Shortened Protocol for prioCHECK FMDV NS ELISA

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Introduction: Foot-and-mouth disease (FMD) is an extremely contagious and severe vesicular disease, caused by foot-and-mouth disease virus (FMDV), which affects cloven-hoofed animals. There are 7 distinct serotypes—O, A, C, Asia1, and SAT 1, 2, and 3. The viral capsid consists of 4 structural proteins (VP1–4). Antibodies against these proteins are serotype specific. The nonstructural proteins (NSPs)—3ABC and 3D—are highly conserved and nonspecific.

Controlling FMD requires extreme measures to prevent rapid spread among susceptible livestock and is a major concern in countries with meat and dairy industries. Early and quick detection via laboratory diagnosis is essential for FMD control.

In 2017 the Pirbright Institute, the world reference laboratory for FMD, performed a verification study on a statistically sufficient number of samples (n = 500) to verify the observations from the FLI study about a shorter protocol for testing.

Methodology: For the Pirbright verification trial, 250 characterized serum samples obtained from experimental studies and 250 serum samples from an FMDV-free country without vaccination were tested in parallel by both the PrioCHECK FMDV NS ELISA overnight protocol and the shortened

(single-day) incubation protocol. These samples were from vaccinated and/or infected animals. The majority of samples were bovine (n = 194), porcine (n = 12) and ovine (n = 44). The samples represented sera of O, A, Asia 1, and SAT2 FMDV serotypes. Of these samples, 209

were NSP-positive and 291 were NSP negative using the reference Applied Biosystems PrioCHECK FMDV NS ELISA overnight protocol. The overnight protocol determines the status of the sample.

Results: There was an overall agreement of 96% between the overnight and the shortened incubation protocols. The shortened incubation protocol resulted in 98% sensitivity and 95% specificity when compared with the overnight incubation protocol

Conclusion: *Overnight and short protocol for PrioCHECK™ FMDV NS Antibody ELISA Kit, have both been validated and perform well.*

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Financial Loss Estimates from Bovine Organ and Carcass Condemnation at Malindi Slaughter House

Godrick Mwaringa, Arastus Mazera, Elvis Oyugi and Mark Obonyo

FELTP resident cohort 15(Mwaringa), veterinary public health, Malindi sub county, County Government of Kilifi (Mazera), K-FELTP faculty (Oyugi, Obonyo)

Introduction: Meat inspection is one of the key public health activities that limit introduction of deleterious agents into the food chain from abattoirs. We reviewed slaughterhouse records for the period December 2016 – February 2017 to determine causes of organ and whole carcass condemnation and estimated financial loss from slaughtered cattle.

Methods: This was a cross-sectional study of organ/whole carcass condemnation of the animals slaughtered at the Malindi slaughter house. We Reviewed slaughter house records from July 2016 through December 2016 and collected data on condemnations from December 2016 to February 2017. Data was abstracted and entered into MS Excel, cleaned and analyzed using MS Excel. Financial losses were estimated based on the total slaughtered animals (annual), average market prices of each organ in Malindi and condemnation rate of carcasses and organs.

Results: A total of 453 heads of cattle were slaughtered; 58.3 % (n=453) were male, of the slaughtered female 32.8% (n=189) were pregnant, 79.5% (n=453) were sourced from outside the sub county. Whole carcass/organ condemnations from the total slaughtered animals were 24.7% (n=453) of which 9.8% (n=112) were whole carcasses. Lung (24%), kidney (22%) and liver

(21%) were the most condemned organs in that order and the leading reasons for condemnation were nephritis (17%), liver necrosis (12%), pneumonia (8%) and lung congestion (8%). Financial loss as a result of organ and/or carcass condemnations was estimated at Kshs. 28.2 million of which 22 million was contributed by condemned fetuses and their lost future value.

Conclusion: Condemnation of organs or carcasses, indiscriminate slaughter of pregnant cows lead to significant loss of meat and livelihood of the people. This justifies the need for appropriate surveillance and disease control programs to reduce condemnations and financial losses.

Enhanced Syndromic Surveillance (ESS) for Early Detection of Rift Valley Fever Outbreak in Marsabit County, Kenya, May – July, 2018

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Introduction: Enhanced surveillance systems (ESS) have been used in Kenya for early detection and control of Rift Valley Fever (RVF) disease outbreaks. The aim of this study was to document performance of ESS in Marsabit County and make recommendations for improved surveillance of other livestock diseases.

Methodology: We reviewed weekly reports sent by sub-county veterinary officers (SCVOs) to Zoonotic Disease Unit (ZDU). Three sub-counties were selected based on geographical terrain (all three are in lowland areas of the county), previous history of flooding, susceptible livestock population, and amount of rainfall received in the long rain season of 2018. The SCVOs recruited 20 farmers from each of the three sub-counties who they called on weekly basis to gather information on RVF related syndromes, climatic condition, vector population density and livestock production system. Data were entered in MS Excel. We described trends in reporting

by farmers, relationship between reported syndromes and different species and geographical distribution of climatic conditions related to RVF outbreak.

Results: We reviewed a total of 302 reports. A total of 32,215 syndromes were reported between May 27th and 14th July 2018; abortions 27.9% (8,984), bleeding 52.4% (16,896) and mortalities 19.7% (6,335). Livestock species affected; sheep 39.4% (12,695/32,215), goats 39.1% (12,602/32,215), Cattle 18.2% (5,872/32,215) and Camel 3.2% (1,046/32,215). Of all the reports submitted, 65.6% (198/302) were submitted in June 2018. Syndromes reported by the farmers; bleeding in cattle 65.2% (3,831/5872), in sheep 57.8 % (7,332/12,695), in goats 40.3% (5059/12,566) and camel 61.0% (638/1,046). Abortion in cattle 30.9% (1,812/5872), sheep 27.5% (3495/12,695), goats 28.1% (3532/12,695) and camel 13.9 % (145/1046). Mortality in cattle 3.9% (229/5872), sheep 14.7% (1868/12695), goats 31.6% (3975/12,566), and Camel 25.1% (263/1046).

Conclusion: Enhanced surveillance was able to pick the early warning signs of RVF outbreak in Marsabit and overall reporting rate improved.

Key words: Enhanced surveillance, syndromes, rift valley fever, Marsabit.

A Situation Analysis of Prophylactic Health Products Usage in Livestock and Aquaculture In Kenya

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In light of increasing need for healthy animal protein, commercial fish farming is emerging globally. Development of commercial fish farming involves intensification of aquaculture systems and this will necessitate use of either antibiotics or non-antibiotic prophylactic health products to support the intensive aquaculture. This paper seeks to establish the presence, usage and knowledge of probiotic health products in Kenya as well as to understand their regulatory

framework. A survey involving 200 agrovet outlets was conducted to establish presence, their active ingredients, usage, sales and usage of prophylactic health products in farmed animals and barriers in the use of probiotics in Kenya. Additionally, key informant interviews were conducted to map the regulators, manufacturers, sellers and users in the industry. The results indicated presence of probiotics in the market but there is very low understanding of probiotics by sellers and farmers, low usage by farmers and a weak regulatory framework, hence doubtful quality of the products. Prophylactic health products for aquaculture exists in the market but are only used in other livestock as fish farmers are unaware of their existence and potential in aquaculture application. The study findings highlight a great need for awareness creation among the potential probiotic users and dealers as well as a need for development of regulatory guidelines and strengthening of the regulatory framework.

Key words: antibiotics; aquaculture; livestock; probiotics, prophylactic

Efficacy Of Selected Anti-Mange Agents Against Natural Mite Infestations Of Rabbits In Central Kenya

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Mange is an important disease affecting rabbit farming in Kenya. Three forms are commonly reported in Kenya; psoroptic, sarcoptic and cheyletiellosis mange, though mixed infestations do occur. Economic losses due to mange arise mainly from morbidities although mortalities are occasionally reported in severe cases. Farmers in Kenya use extra-labelled conventional drugs like ivermectin and carbaryl, and nonconventional ones like liquid paraffin in treatment of mange. However, there is no documented efficacy of these agents against local mite isolates. The current study determined the efficacy of carbaryl, ivermectin, selamectin and liquid paraffin against rabbit mange in Kiambu and Nyeri counties. A controlled laboratory study was undertaken where 20 mange-infested and 4 mange-free adult rabbits of mixed breeds were recruited. Mange-infested rabbits were randomly allocated into 5 treatment groups: ivermectin group (IG), carbaryl group (CG), liquid paraffin group (LG), selamectin group (SG) and positive control group (PG) each with 4 rabbits. The 4 mange-free rabbits formed the negative control group (NG). Rabbits in IG were treated with two ivermectin injection at interval of 14 days, CG

received a combination of sevin and liquid paraffin applied every other day, LG was treated with liquid paraffin droplets applied daily, SG was under selamectin applied once on the skin while group PG received distilled water applied topically on their ears. Rabbits in group NG did not receive any treatment. Samples were taken daily to evaluate viability of mites and psoroptic mange lesions scored. Thereafter, effectiveness of the test agents was evaluated in 105 mange infested rabbits in a field trial. From the results, ivermectin, selamectin, liquid paraffin and sevin-liquid paraffin combination were all efficacious against rabbit mange. The compounds eliminated the lesions associated with mange by day 21 in both the laboratory and field trials.

Key words: carbaryl, ivermectin, liquid paraffin, *Psoroptes cuniculi*, selamectin, trial

Mutual Recognition Agreement for Veterinary Practitioners Within the East African Community Member States

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Mutual Recognition Agreement (MRA) for Veterinary Professionals is part of the initiative by the East African Community (EAC) to widen and deepen the cooperation among the member states in the economic, social and political field for their mutual benefits. The MRA is one envisaged aspect in the East African Common Market Protocol with the objective of liberalizing veterinary professional services within the EAC member states which in essence allows free movement of practitioners. There are three other professionals viz engineers, accountants and Architects who have also signed similar MRAs.

The journey of developing MRA in the Veterinary profession started in 2013 and after a series of meetings the agreement was signed in Arusha, Tanzania on 17th March 2016 by the registrars and chairpersons of the veterinary statutory bodies in the member states.

The main thrust in the MRA is to recognize the academic and professional qualifications, experiences gained, licences and certification granted; and to harmonize curricula, examinations, standards; certification and accreditation of education and training institutions. This enables movement of professional services within the region.

The word and spirit of the Agreement is to have veterinary professional and paraprofessionals practicing freely within the EAC Region as long as they meet the set terms and conditions. Effective implementation of the MRA will be achieved after the attendant challenges in the Partner States are adequately addressed.

Infertility In Dairy Cattle In Selected Parts Of Kenya

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Dairy fertility is determined by the reproductive indices which include age at first calving, number of inseminations per conception and calving interval among others. A survey to find out the causes of infertility in cows was conducted in nine Counties during mid-2017. The Counties were selected based on the climatic conditions and respondents selected using a multi-stage sampling method. Data were electronically collected using tablets and smart phones installed with open data kit (ODK). Data from 1497 households were exported to excel spreadsheets then transferred to SPSS for analysis.

The average number of animals per household in the study was four for Semi-Arid and Western regions, five for Nyanza and six for Rift Valley. The average milk production was 5-6 litres across the regions. About 50% of the cows were in milk. The average age at first calving across the regions was 22.7 months while the average calving interval was 1.5 years, Farmers cited poor nutrition as the common cause of prolonged calving intervals in the Semi-Arid and Rift Valley regions, while poor heat detection was cited more in Western and Nyanza regions. Interventions to mitigate the two problems are required in order to reduce the calving intervals and improve reproduction and productivity in the study regions.

Key words: age at first calving, dairy cattle, infertility

A Cross-Sectional Study On Infertility In Dairy Cattle In Selected Counties Of Kenya

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Dairy production in Kenya is one of the most developed in sub Saharan Africa. Despite this, it is still faced by challenges attributed to poor nutrition, inappropriate breeds and breeding practices, prolonged inter-calving intervals, reproductive diseases among others. A study to establish the proportion of pregnant cows in selected dairy herds as a proxy measure for infertility was conducted in three Counties of Kenya from October 2017 to July, 2018. A total of 73, 71 and 72 herds were purposively sampled from Nandi, Makueni and Kakamega respectively. The herds corresponded with individual households. Animal examination and serum samples were

collected from each cow to test for antibodies against Bovine Viral Diarrhea (BVD) and Neosporosis (*Neospora Canis*). Overall, pregnancy rate for the three counties was 30.5% with 69.5% of the cows examined being open. Makueni County had a significantly ($p < 0.05$) higher pregnancy rates compared to both Kakamega and Nandi. Anoestrus was reported in 46.4% across all the herds and was highest in Makueni followed by Kakamega. Repeated inseminations were reported in over 60% of the study population with the average number of inseminations before conception being 1.6 times, with an average CI of 18.8 months. The sero-prevalence of neosporosis was 24.1 % ($n = 552$) and Bovine Viral Diarrhea Virus 52.3% ($n = 545$) across all the counties. Co – infection prevalence of the two infections was 14.6 % ($n = 541$). Chi square tests of association between prevalence and county was significant for BVD ($p = 0.000$) but not for neosporosis ($p = 0.626$). Further chi square tests of association between the two infections was not significant ($p = 0.105$) as well as tests of association on significance of BVD ($p = 0.575$) and neosporosis ($p = 0.626$) on pregnancy status.

Key words: Bovine Viral Diarrhoea, Calving interval, Dairy, Infertility, *Neospora caninum*, Repeat breeding

Investigating The Socioeconomics Of Foot And Mouth Disease In Selected Kenyan Farming Systems

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Keywords: Foot and mouth disease; disease control; socioeconomics

Foot and Mouth Disease (FMD) is endemic in Kenya, with frequent outbreaks. Currently control focuses on vaccination of cattle, mandated by public veterinary services during outbreaks and implemented alongside movement control. Additionally, privately paid and managed prophylactic vaccination is practiced on some farms. In order to improve disease control, a structured disease control program is currently being implemented. An important component of designing any such FMD control program is to understand the socio-economic drivers that affect

disease control within relevant livestock systems. However, globally, few studies have examined this subject in depth.

Over the next three years, this Kenya-UK collaboration will investigate the socioeconomic factors affecting FMD control in Kenya. This will include a description and assessment of previous FMD control efforts in Kenya, integrating this knowledge into analysis of relevant livestock production and animal healthcare systems. This will be followed by investigation of farmer willingness to prioritize and pay for FMD disease control, alongside economic disease impact analysis. Ultimately, the study aims to describe control options in terms of cost-effectiveness.

The study will have two main areas of impact. Firstly, it will produce recommendations for improving management of FMD in Kenya, and implications for its control to the Kenyan economy. Secondly, it is hoped that this work will provide a framework that other countries embarking on their PCP journey can use for their socioeconomic studies. Ultimately, this work will build an understanding of how FMD, and its management, affect and are affected by the wider animal healthcare and food systems they exist within.

Exploring Economics Of Large-Scale Broiler Chicken Production Systems Within Kenya.

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Objectives: estimate unit cost of production of dressed weight and calculate economic losses associated with poor animal welfare within the current Kenyan broiler production systems.

Data collection: primary data collected from medium and large-scale broiler farmers in four counties: Nairobi, Kiambu, Machakos and Kajiado. Additionally, secondary data collected on number and type of broiler chicken condemnations at processing factory, and additional data extracted from published reports.

Data analysis: quantitative data were analysed using descriptive statistical measures while qualitative data were presented as thematic analysis. The economic analysis was accomplished using bio-economic model developed in Microsoft excel using a gross margin analytical framework.

Key findings: Cost of mortality in farms was estimated at Ksh 24,000 for large-scale farms and Ksh 3,491 for medium-scale farms; The cost of feed estimated to comprise about 63% for total

variable costs for large-scale farms and about 65% for medium-scale farms; The cost of purchase of day old chicks comprised about 24% of total variable costs for medium-scale farms and 28% of the total variable costs for large-scale farms; Cost of producing 1 kg of dressed weights: Large- scale farms Ksh 172, and in medium scale farms Ksh 222; Cost of rejection of broiler chickens at slaughter was estimated at Ksh 80,934 for large-scale farms; Apart from cost of feed and purchase of day old chicks, cost of electricity, animal health, and condemnation of broiler chicken at processing plants in addition to cost of mortality in farms have a high contribution to total variable costs; The rate of broiler condemnation at slaughter was estimated at 1.18%; and causes of condemnation included ascites, emaciations and cadavers; The estimated gross margins per broiler for large-scale farms was Ksh 548,226 and Ksh 37,889 for medium-scale farms; Downgrade losses from farm and factory due to bruises on breasts, legs and wings; broken wings and legs; and fractured breast accounted for 0.77 % of production costs which was estimated at Ksh 48,415.

Recommendations: Interventions on feeding, which is the main cost centre should address innovations on diets that reduces costs.

Keywords: production costs; large scale broiler farms; welfare losses

Randomized Controlled Trial Of Effects Of *Calliandra* And *Sesbania* Supplementation On Daily Milk Production In Dairy Cattle On Commercial Smallholder Farms In Kenya

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There is a growing interest in protein supplementation of dairy cows using leguminous shrubs. The study objective was to ascertain the association between diet supplementation with *Calliandra calothyrsus* and *Sesbania sesban* and milk production in dairy cattle on commercial smallholder farms.

This trial involved 235 cows from 80 smallholder dairy farms (SDFs) randomly allocated to 4 treatment study groups in Kenya; 1) receiving *Calliandra* & *Sesbania* and nutritional advice; 2) receiving reproductive medicines and advice; 3) receiving both group 1 and 2 interventions; and 4) receiving neither intervention. Farm nutritional practices and management data were collected in a questionnaire, and subsequent physical examinations, mastitis tests and milk production of cows on the farm were monitored for 16 months. Descriptive and univariable statistical analyses were conducted, and multivariable mixed model regression was used for identification of factors associated ($P<0.05$) with the natural log transformed daily milk production of cows on a given farm.

The mean milk production cow⁻¹ day⁻¹ was 6.39 liters (s.d. 3.5) with a median of 6.0 liters. Feeding *Calliandra* / *Sesbania* to cows was significantly ($P<0.0005$) associated with at least one-liter crease in milk produced cow⁻¹ day⁻¹ with every kg fed. Other variables positively associated with ln daily milk production in the final model included: feeding of Napier grass, amount of silage and dairy meal fed, body condition and appetite of the cow. Other variables negatively associated with ln daily milk production in the final model included: amount of maize germ fed, days in milk, sudden feed changes, pregnancy and subclinical mastitis.

In conclusion, our field trial data confirm that use of *Calliandra* / *Sesbania* through agroforestry can be used to improve milk production in commercial SDFs in Kenya. Agroforestry land use systems can be adopted as a way for dairy farmers to cope with feed shortages and low crude protein in farm-available feeds for their cows.

Key words: Kenya; Agroforestry; Smallholder; *Calliandra*; *Sesbania*; Milk production

Pet Owner Factors Affecting Small Animal Welfare (Dogs And Cats) With Regards To Veterinary Care In Nairobi

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Introduction: The changing role(s) of companion animals, accompanied by changes in human lifestyle places companion animals at great risk of poor welfare. Animal welfare consists of three distinct but overlapping domains (i) Health and physiological functioning (body) (ii) affective state (mind) and (iii) social functioning, including normal development, behavior and temperament (nature). This study was intended to evaluate the factors that influence dog and cat welfare with regards to their general health and overall physiological functioning from a pet owner's perspective.

Methodology: Questionnaires in addition to online research were applied as data collection methods. Primary and secondary data sources were used. The study targeted 175 respondents encompassing a diverse array of pet owners.

Results: The study findings revealed that high cost of veterinary services in Nairobi is one of the major reasons that pet owners do not seek professional intervention and thus making its inaccessibility a major contributor to poor animal welfare. The study also implied that there is a direct correlation between the economic and financial status of a pet owner, their level of education and knowledge and good animal welfare.

Conclusion: Improvements should be made in bridging the relational gap between the veterinarian and the pet owner in terms of dissemination of information and ethics in order to maintain proper animal welfare.

Key words: cat and dog welfare, pet owner characteristics, Nairobi and environs

The Incidence Age, Breed Predisposition and Types of Fractures in Household Dog in Nairobi County, Kenya.

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Dogs are common companion animals worldwide and are vulnerable to traumatic injuries leads to appendicular bone fractures. There was need to carry out retrospective studies to improve understanding on aetiology, clinical signs, diagnosis of fractures and major orthopaedic diseases.

A study was conducted with aim to determine incidence, age, breed, gender, neuter status, etiology and spatial distribution in household dogs diagnosed with appendicular bone fracture; to describe diagnostic and therapeutic intervention, evaluate the incidence of vertebral bone to appendicular bone fractures.

The study was achieved through retrieving all case records of dogs diagnosed with appendicular bone fractures between January 2014 and September 2016 using a questionnaire developed to fulfil the aim of the study.

The 200 fracture cases in the study were appendicular bone fractures 76.36% (168/220). Of the appendicular fractures; 76% occurred in entire males and females, 27% in neutered males and spayed females with more fractures in neutered dogs than in spayed females, higher incidences were recorded in young dogs between the ages of 6months to 6years, highest incidences in 7 to 14months old (33%) with the medium sized breeds of dogs (6-10kgs) affected more (41%). Hind limb fracture indices: femur 22%, pelvic bones 21% and tibia-fibula 14%. Forelimb, ulna-radius 22%, humerus 8%; 36% of the cases reported were spiral-oblique and 32% transverse fractures.

Treatment involved external and internal fixation: Plaster of Paris, intramedullary pins, adhesive bandages, Roberts Jones bandage, orthopedic wires, plates and screws.

The study concluded that household dogs are susceptible to appendicular bone fractures, more in males than female dogs, entire males and females are affected more than neutered males and spayed females; more in the hind limb than the forelimb.

Hematological Effects Of Ketofol In Acepromazine Or Medetomidine Sedated Dogs

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This was a randomized blinded clinical study conducted to evaluate the effects of ketofol on hematological parameters in acepromazine and medetomidine sedated dogs. Twelve (12) entire male mongrel dogs were randomly divided into two groups (Group A and Group B) of six (6) dogs each. Dogs in Group A were premedicated with acepromazine at 0.1 mg/kg BWT and those in Group B with medetomidine at 0.02 µg/kg BWT. Anaesthesia in both groups was induced and maintained using Ketofol (4.0 mg/kg (2 mg/kg Ketamine and 2 mg/kg Propofol) BWT. This was followed by castration in all dogs and assessment of parameters. Hematological parameters evaluated comprised of total erythrocyte count (TEC), total leucocyte count (TLC), total platelet

count (TPC), packed cell volume (PCV) and hemoglobin concentration (Hb). Data was expressed as Mean \pm SD and compared between the two groups using student t-test. Statistical significance was set at $P < 0.05$. ACP-Ketofol significantly reduced TEC ($P = 0.001$), TLC ($P = 0.007$), PCV ($P = 0.02$) and Hb ($P = 0.04$) compared to Med-Ketofol. These changes did not lead to any notable deleterious effects in the patients post-operatively and into recovery. However, prudent perioperative monitoring of dogs, more so those under acepromazine-ketofol anaesthesia is imperative so as to reduce anaesthesia related morbidity and mortality.

Clinical Diagnosis and Management of Pleural Effusion in A 2-Year-Old Entire Male German Shepherd Dog: A Case Report

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A 2-year-old German Shepherd dog was presented to the University of Nairobi, Small Animal clinic with a history of persistent transient respiratory distress. Physical examination revealed harsh lungs, increased respiratory rate with thoraco-abdominal breathing. All vital parameters were within normal ranges. The haematological examination revealed a normal white blood cell count, normal neutrophil count and mild eosinophilia. Radiographic examination revealed increased radio-opacity in the ventral thoracic region on lateral view, a standing radiograph revealed a distinct fluid line. A dorso-ventral view revealed increased opacity of the left and right mediastinal region with the cardiac silhouette completely obliterated due to super imposition. A scan of the chest cavity revealed presence of free anechoic fluid in the pleural cavity. The fluid was surrounded by hyperechoic filamentous like membranes. The heart and lungs showed normal echogenicity and margination. Thoraco-centesis of the fluid reveal a straw coloured clear fluid with a specific gravity of 1.016. A tentative diagnosis of pleural effusion of unknown aetiology was determined and management was aimed at resolving the case. Medical management using furosemide at 60mg bid for 1 week was attempted with no improvement. An exploratory thoracotomy was indicated to determine the cause of the pleural effusion as well to drain the fluid which had accumulated. Surgery was routinely done through an intercostal thoracic wall approach. 1800ml of blood tinged fluid was collected from the thoracic cavity. Fluid was localised in membranous sac like structures attached to the pleural membrane. Examination of the thoracic cavity revealed no obvious signs of masses. The incision was routinely closed and the dog made a full recovery.

Key words: pleural effusion, thoracotomy, dog

The Assessment of Learning and Proficiency of Imaging Modalities in Undergraduate Students of the University of Nairobi Taking Bachelor's in Veterinary Medicine.

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Diagnostic imaging is used as confirmatory diagnostic techniques for various conditions. This discipline cuts across all categories of veterinary medicine and is thus a crucial lesson in veterinary teaching. The teaching of diagnostic imaging is divided into theoretical classes where the principles of the different techniques are taught and practical lessons where machine physics and image generation and interpretation are covered.

At the University of Nairobi, Faculty of veterinary medicine teaching of diagnostic imaging is done during the 4th and 5th year levels of study. Different imaging modalities are taught to the 4th and 5th year students and practical classes held intermittently during the periods of study. The different diagnostic imaging modalities taught are Radiography, Ultrasonography, computed tomography, magnetic resonance imaging and scintigraphy. Practical classes taught are limited to only 2 diagnostic imaging modalities which are mainly Radiography and ultrasonography due to the availability of these two imaging modalities at the Faculty.

A study was conducted at the University of Nairobi veterinary school to evaluate the proficiency of the 4th and 5th year students in the different diagnostic imaging techniques. This study randomly selected 33 students in each of the respective years of study (50% of each class). The students filled questionnaires regarding different imaging modalities ranging from their knowledge of the different techniques, the ability to operate the machinery, image interpretations as well as needs for further exposure.

From the study it was found the most students had excellent understanding of the radiography and ultrasonography. Students asked to list the different imaging modalities listed two out of the five modalities. Machine operation ranked lowest in Magnetic resonance imaging, computed tomography and scintigraphy with radiology and Ultrasonography ranking the highest. Image interpretation also ranked lowest for Magnetic resonance imaging, computed tomography and scintigraphy with radiology and Ultrasonography ranking highest. The study concluded that the exposure to advanced imaging techniques such as MRI, CT and Scintigraphy needed to be improved. Though the study found that 90% and 85% confidence in radiography and

ultrasonography most students recommended further exposure in the two modalities due to their use in practice.

Key words: diagnostic imaging, proficiency

Antigenic Structure of Bovine Leukemia Virus Components and Their Importance in The Diagnosis of Bovine Leucosis

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Prior to this study, ELISA commercial kits produced contain only one protein fraction gp51. The aim of our study was to develop a method of BLV-antigen production and exploration of antigenic properties of protein fractions obtained from the blood sera of infected and sick cows. Blood serum samples were collected from cows in Tatarstan Republic. Kurskaya biofactory commercial kits for the detection of antibodies to BLV in the serum using ELISA were used. For positive samples circulating immune complexes were extracted using precipitation method in PEG-6000. The antigen was extracted by dissociation of CIC at 60°C for 1 hour, precipitation in saturated ammonium sulphate solution, filtration, dialysis of the supernatant against distilled water and its concentration against silica gel L100/250.

ELISA was conducted using indirect solid-phase modification according to the method described by Woller A. et al. (1976) with the test antigen. Disc-electrophoresis of test antigen was conducted according to Laemmli (1970). Electrotransfer of proteins fractionated in polyacrylamide gel to the nitrocellulose membrane was conducted using the technique described by Towbin et al, 1979.

The test antigen is complex containing different protein fractions of BLV. Molecular masses of electrophoretic fractions range from 14 to 160 kDa. From the results of immunoblot analysis, an antibody is produced against every viral protein fraction depending on the stage of infection. At the initial stages of infection antibodies are produced against p40. As the infection progresses antibodies are formed against p24 and other protein components. ELISA results using the test

antigen and commercial kit antigen generally coincided. However, some samples that tested negative with the commercial kit, gave positive results with the test antigen.

In conclusion, in the CIC contained in the serum of infected cows, different viral various protein fractions are present, which are not present in the commercial kits resulting in false negative results. The developed method allows extraction and the use of these protein fractions as antigens in immunochemical reactions for enhancing the diagnosis of bovine leucosis. The specificity of the extracted antigen corresponds to that of antigen gp51 used in the commercial kits for ELISA, and its sensitivity predominates that of the commercial kits. The extracted viral antigen is complex and allows the complete detection of the antibodies produced against BLV, hence increasing BL surveillance in control programs.

Keywords: BLV, antibody, circulating immune complex, PEG-600, electrophoresis, immunoblot.

Risk Mapping Of Milk Contamination By Antimicrobial Residues In Githunguri Sub-County, Kiambu County

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Globally, consumers are increasingly becoming aware of food safety. Negative organoleptic perceptions are a significant barrier to trade of food items. Evidence from various studies conducted in and around Nairobi County show that consumers are willing to pay a premium for safe food, vegetables and milk. Milk products harbor a special significance as they are consumed more by infants, invalids and geriatrics. Contamination with antimicrobial residues poses health risks and the potential of development of antimicrobial resistance to consumers. Additionally, it is a constraint to value addition leading to loss of revenue. A survey was conducted in the month of August 2018 to identify possible risk of antimicrobial contamination in milk produced by dairy farmers in Githunguri sub-County.

A total of 387 dairy farmers were included in the survey from the five wards of the sub-County. Interviewees were selected through a mixed method sampling approach employing purposive and snowballing sampling. A semi structured questionnaire was used for data

collection. Survey results indicated (point estimates): 76.5% withhold milk from treated quarter only; 61.5% do not record animal treatment; 14% do not observe absolute milk withdrawal; 1.6% are not advised on milk withdrawal and 1.3% do not observe milk withdrawal. These findings highlighted significant knowledge gaps and practice deficiencies by both farmers and animal health providers that could contribute to contamination of milk by antimicrobials. Training of extension officers and veterinarians was recommended to promote antimicrobial stewardship. They would in turn appropriately advise farmers. A monitoring component was also advocated for to objectively assess milk for antimicrobial residues and indirectly evaluate the effectiveness of training.

Key words: Antimicrobial residues, milk, food safety

Common Livestock Diseases Syndromes Reported Through The Kenya Livestock Wildlife Syndromic Surveillance, Bomet County, March –December 2018.

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Introduction: Kenya is shifting from manual system of disease surveillance to electronic methods. Manual surveillance system is characterized by delays in information sharing thus leading to poor stakeholder's response preparedness. The objective of the study is to evaluate the Kenya livestock wildlife surveillance system (KLWSS) and also describe the common livestock diseases reported during the study period.

Methods: We reviewed records submitted to KLWSS by Bomet County veterinary personnel from March – December 2018. The retrieved data was analyzed using Ms Excel. Frequencies and proportions were calculated for the selected continuous variables. CDC updated guidelines for evaluating surveillance system was used to analyze surveillance system attributes (usefulness, representativeness)

Results: A total of 304 reports were submitted electronically to KLWSS during the study period. All the five Sub-Counties of Bomet county submitted reports. Sotik Sub-County had the highest cases 104 (34%) while Bomet Central had the least 16 (5%). Species reported include cattle

188(62%), dogs 47(15%). Localities of reports submission were; farms 199(65%), Abattoirs 102(34%). Diagnostic method applied included clinical examination 258(85%), laboratory analyses 2(0.6%). Syndromes of public health importance reported included; neurological 48(16%), animal bites 46(15%), sudden deaths 28(9.2%), abortions 22(7%).

Conclusion: Based on reported syndromes there are recurrent outbreaks of zoonotic diseases. Sample submission for laboratory confirmation should be enhanced to improve accuracy of the diagnosis made.

Keywords: Kenya Livestock Wildlife Syndromic Surveillance System, Bomet county, Directorate of Veterinary Services,

Distribution and Genetic Diversity of *Echinococcus granulosus* in Western Kenya

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Background: Cystic echinococcosis (CE) has been localized in the Turkana and Masai communities of Kenya. However, due to livestock movement from endemic areas to western Kenya through trade routes, the disease may establish in CE free western region owing to poor slaughter condemnation and slaughterhouse porosity to scavenger dogs. This study determines infection levels of Livestock CE and genetic variability of the parasite in western Kenya as well as the potential role of dogs in transmission of *Echinococcus granulosus*.

Methods: From 12 slaughterhouses, cystic material were collected through post-mortem surveys and single protoscolexes lysed for nested PCR targeting NAD1 and COX1 gene fragments. PCR products were sequenced for haplotyping. On the other hand 16 slaughterhouses were selected and around each slaughterhouse questionnaires regarding dog practices were administered in ten homesteads owning free-roaming dogs. Faecal samples collected from dog's rectum were examined microscopically for taeniid eggs and other canine intestinal parasites.

Results: From the 932 carcasses, 288 kg of offal were condemned. 60 cysts yielded amplification product with NAD1 gene and presented a banding pattern of *Echinococcus granulosus sensu stricto*. 10 COX1 and NAD1 products mapped as *Echinococcus granulosus* upon sequencing. COX1 exhibited greater diversity with 10 polymorphic sites with 9 haplotypes (6 new, 3 known). Taeniid eggs were presumptively identified in 9 dog samples but await confirmation or elimination by Copro ELISA technique. 94/152 (62%) dog samples had hookworms, 16/152 (11%) had Ascarids. Few *Trichuris* spp were also reported.

Conclusion: This is evident that the livestock slaughtered in western Kenya present with CE posing the risk of facilitating establishment of echinococcus life cycle in a CE free region. Economic losses are evidenced by the high rate of offal condemnation. There is carriage of zoonotic parasites by free-roaming domestic dogs in western Kenya posing risk to human and livestock populations.

Key words: *Echinococcus granulosus*, Taeniid eggs, slaughterhouse, haplotypes, livestock, dogs, life cycle.

Community Structure and Host Association of Ticks Parasitizing Wild Animals in Kenya.

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Keywords: wild animals, ixodid ticks, ecology

The Kenyan savannah and forests is an essential habitat for wild animals and an extensive assemblage of ticks. Ticks and wild animals have co-existed for many centuries with some ticks specializing and parasitizing specific animals. Although the relationship between wild animals and tick parasites is nonthreatening, tick-borne haemoparasites have led to disease and mortality in wild animals. Although most tick-borne diseases have endemicity associated with natural environments, data on wildlife host is lacking. The present study, conducted between 2008 and 2019, aimed at documenting the species diversity of ixodid ticks of wildlife in Kenya.

Ticks were collected opportunistically from 700 wild animals of diverse species immobilized for treatment and other management activities across Kenya. Ticks were collected from mammals, birds and reptiles of different species. Ticks were identified and counted under stereo microscope using standard morphological keys. Collected ticks were stored in 98% ethanol for DNA preservation.

Seventy (45) tick species were collected and new host associations were demonstrated from 700 wild animals. New host records were ascertained for six ticks namely, *Amblyomma cohaerens*, *Rhipicephalus armatus*, *Rhipicephalus pravus*, *Rhipicephalus carnivoralis*, *Amblyomma lepidum* and *Hyalomma truncatum*. New host associations were recorded, locality records were discovered and one ticks discovered.

Unusual Mortalities of the Eastern Black Rhinoceros (*Diceros Bicornis Michaeli*) due to Clostridial Enterotoxaemia in Ol Jogi Pyramid Sanctuary, Kenya

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Nine eastern black rhinoceroses (*Diceros bicornis michaeli*) developed clinical clostridial enterotoxaemia between May and July 2010 in the Pyramid Black Rhino Sanctuary within the Ol Jogi Conservancy, Laikipia, Kenya. The rhinos presented with a per-acute syndrome characterized by severe abdominal pain manifested by struggling and rolling on the ground and laboured breathing, and they died within three hours after being sighted sick. Necropsy and histopathology revealed severe pathology in the gastro-intestinal tract. Grossly, the small and large intestines were congested and oedematous. All the rhinos had variable amounts of haemorrhagic fluid in the intestines. Microscopically, the most characteristic lesion was severe necrotizing haemorrhagic enteritis. Numerous Gram-positive rod-shaped bacterial colonies that were identified to be *Clostridium* spp. were occasionally seen in the intestinal mucosa. *Clostridium perfringens* type A was isolated from the stomach contents. *C. perfringens* was postulated as the aetiological agent with the infection triggered probably by change of habitat following a prolonged period of drought that was followed by above-normal rainfall.

Additional key words: *Clostridium perfringens*, necrotizing haemorrhagic enteritis

Confirmation of Canine Distemper Outbreak in Wild and Domestic Carnivores in the Laikipia Ecosystem, Laikipia County Kenya

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Canine distemper was reported in 7 packs consisting of 42 dogs in Laikipia ecosystem in northern Kenya. Although the outbreak started in domestic dogs it later spread and spilled over to wild dogs, silver backed jackals within the Laikipia and Samburu Counties. The disease was suspected due to the clinical signs of lethargy, dark tarry diarrhoea, mucopurulent nasal discharge, un coordinated walking, mucoid nasal discharges and uncontrolled muscle twitching.

14 urines, blood and serum samples were collected frozen and transported to diagnostic laboratory. Serological tests from commercial antibody (Immunocomb®) and antigen (Biopanda reagents®) test kits was conducted by the disease using urine, serum and whole blood. 7 tested positive, 5 negative and 2 inconclusive on antibody. 4 tested positive 6 negative and 2 inconclusive on antigen. A second antigen test 5 tested positive 4 negative and 5 were not done.

Reverse transcription-PCR (RT-PCR) was used to detect canine distemper virus (CDV) nucleoprotein (NP) in brain samples from 11 dogs with clinically suspected distemper. A Morbillivirus primer P1: 5'ATGTTTATGATCACAGCGGT 3' and P2: 5'ATTGGGTTGCACCACCACTTGTC3'. 1800 domestic sympatric community dogs were vaccinated against rabies (Defensor®) and canine distemper (Van guard®) in community areas around key conservation areas in Laikipia this formed a ring vaccination to curtail spread to wildlife.

Canine distemper is an important pathogen affecting the conservation of endangered carnivores. Routine dog vaccination has the potential to prevent wildlife spill overs.

Key words: Canine Distemper Virus, *Morbillivirus* , wild dogs *Paramyxoviridae*

Experiences and Challenges in Managing Orphaned/Abandoned Elephants in an Elephant Sanctuary in Northern Kenya

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African elephants (*Loxodonta africana*) have a long lifespan (up to 80 years), generally live in social groups consisting of related females and calves and have long offspring dependency. The

calves depend on their mothers and other family members for social support, survival, and learning for the first years of life. Female calves remain in their families whereas males disperse during adolescence, approximately at age 14 years and play no role in rearing of the offspring.

With the current conservation challenges including habitat degradation, poaching, human-wildlife conflict among others, abandoned or orphaned elephants have become a common occurrence and this requires human intervention to give them the best welfare possible. These interventions require rescue and rehabilitation of these animals with an ultimate goal of releasing them back to the wild. Reteti elephant sanctuary is a community owned elephant project and was founded in 2016 with a view to rescuing and rehabilitating abandoned/orphaned elephants and later releasing them to the wild. Capture and rescue is undertaken by professional care staff and transport is either by helicopter or vehicle. Upon arrival at the sanctuary best welfare of the animal is taken which include; quarantine, health screening, proper nutrition, enrichment, training for natural characteristics and weaning as part of re-wilding process. Currently the sanctuary has 15 elephants and 3 of these have attained the weaning age of 3.5-4 years old and are ear-marked for release before the end of 2019.

This paper describes the practices, experiences and challenges faced in managing these abandoned or orphaned elephants in an elephant orphanage in Northern Kenya. The experiences learnt will improve on the welfare of rescued elephants as well as general conservation of free-ranging wildlife in Northern Kenya.

Key words: African elephants, Abandoned, Orphaned, Rescue, Rehabilitation, Re-wilding

Review of Effects of Pyric Herbivory on Pasture Quality and Quantity in an East African Savanna Ecosystem

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Human reliance on tropical savanna ecosystems continues to rise due to the increasing human population, dwindling livelihoods and climate change. This has intensified the frequency and magnitude of disturbances associated with human exploitation of savannas. These include livestock rearing and herbivory, anthropogenic fires, and bush clearing for crop farming among others. Disturbances such as fire and herbivory can have profound effects on structure and

function of savanna ecosystems. Several research studies have been carried out with regards to these effects. In Kenya however, there is scanty information on the effects of herbivores, domestic or wild on pastures. Systemic and orderly data on herbivore effects on savanna pastures therefore need to be availed for relevant stakeholders such as pastoralists and policy makers for optimal utilization of this ecosystem. In this paper, twenty six (26) related research articles on the effects of herbivore and fire were reviewed to obtain a pool of data on the effects of pyric herbivory on savanna pastures. It was noted that herbivores can improve pasture quality and quantity in various ways. These include; opening up spaces through which rare and cryptic species then germinate; increasing forage growth and abundance through manure addition and maintenance of pasture in a state of higher vigor and growth potential in addition to shorter heights ideal for grazers through trampling and defoliation. On the other hand, herbivory can have negative impact on pastures through reduction in pasture diversity and richness and pasture depletion. Therefore, it can be concluded that fire and herbivores are an important component of pasture management in the savanna. The information from this review thus provide useful guidance during implementations of various savanna land management strategies for optimal and healthy use of the savanna range lands by the pastoralists, policy makers and other stakeholders.

Key word; Pasture, Herbivory, Fire, Savanna

POSTERS

Assessment of Farmers' Compliance to Implement Cow Comfort Changes Recommended, and their Effects on Lying Time, Stall and Cow Cleanliness on Smallholder Dairy Farms in Kenya

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Our study aimed to evaluate farmers' compliance in implementing farm-specific cow comfort changes recommended, and the effects of the change on lying time, stall cleanliness (1-5) and cow cleanliness (1-5) using a randomized controlled trial carried out on 73 smallholder dairy farms in Kenya. The intervention group had 62 farms (n=90 cows) and the control group had 11 farms (n=16 cows).

On all the farms, data loggers were attached on the cows to determine lying time, and questionnaires administered to collect baseline data on the first visit. Three days later, recommendations were given to the intervention group farmers orally and in written form and data loggers removed from all cows. After 39 ± 7 days, data loggers were again attached on cows on all the farms, compliance assessed and a post-intervention questionnaire administered to intervention group farmers. Three days later data loggers were removed from all cows.

Data were analysed on Stata 14.2® with proportions describing the farmers' compliance to implement proposed changes while medians and ranges were described the cow lying time and cleanliness scores. Proportion tests and Kruskal-Willis rank test were used to compare cleanliness scores and lying time respectively, within and between groups, over the assessment time. Univariable and multivariable mixed logistic regression models evaluated factors associated with compliance. Interaction effects between treatment groups and visits were

assessed using multivariable mixed linear and logistic regression models of the natural log of lying time and cleanliness scores respectively.

The farmers' overall compliance was 74% (46/62). The odds of compliance were higher when: major changes were recommended relative to minor changes (OR=6.3, $p=0.004$); and changes recommended were related to floor characteristics (floor softness and flatness) in comparison to changes related to stall design ($p=0.047$). The odds of compliance were lower in: farms where the farm-hands received the recommendations compared to farms that had the wife receive the recommendations (OR=0.01, $p=0.023$); and farms that had proposed changes related to roof, alley and sharps fixes relative to stall design fixes (OR=0.1, $p=0.004$). The farm effects explained about 84.4% of the variation observed in compliance. For farms that implemented at least one recommended change (46 farms), the odds of compliance were lower if: the farmers reported at least one recommendation was hard to implement (OR=0.3, $p=0.021$); if the recipients of the recommendations were men (OR=0.4, $p=0.037$) or farm hands (OR=0.1, $p=0.016$) compared to women receiving recommendations. Post-intervention, stall, udder and upper hind leg cleanliness scores improved significantly ($p<0.0001$, $p=0.021$ and $p=0.017$ respectively) in the intervention farms but remained relatively similar in the control farms.

Giving farm-specific cow comfort recommendations to smallholder dairy farmers in Kenya and providing them with a participatory role in the formulation and implementation of improvement recommendations ensured good acceptance and a high degree of implementation and led to a subsequent improvement in their welfare in terms of cow comfort and cleanliness.

Keywords: dairy cows, compliance, cow comfort

Heat Treatment Of The Blood Serum Samples As A Method Of Increasing The Sensitivity Of Elisa Test In The Diagnosis Of Bovine Leucosis

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The aim of the present study was to define the effect of heat treatment of the blood serum samples on the sensitivity of enzyme-linked immunosorbent assay test during the diagnosis bovine leucosis.

Blood serum samples were collected from calves up to 1-year old and dairy cows of different farms of the Republic of Tatarstan. ELISA and AGID analysis of the samples were conducted based on the instructions of the Kurskaya biofactory commercial kits for serological diagnosis of bovine leucosis. Circulating immune complexes were extracted using precipitation method in PEG-6000.

Results: After the precipitation of circulating immune complexes from the pool of blood sera using 7% solution of PEG-6000 in borate buffer, the titers of anti-BLV antibodies in ELISA test did not change and were equal to the titers of the antibodies in the original sample. After the immune complexes were dissociated with preliminary incubation of the samples at 60°C for 1 hour, the titers of the anti-BLV antibodies in the samples increased and reached 1:1024.

Some samples reacting negative both in AGID and ELISA without incubation, gave positive results after their incubation at 60°C for 1 hour in ELISA. Generally, the values of the optical density of the microplate wells in most cases increased, however, the optical density in some blood serum samples that reacted negative in both AGID and ELISA test after incubation remained intact. The values of the optical density as a result of temperature effect on some samples increased by 1.5 and more.

Conclusion: Identification of specific anti-BLV antibodies in immune complexes increases the authenticity of detecting animals infected with BLV in comparison with the traditionally used method of detecting antibodies in the blood serum. Heat treatment of the serum samples

increases the sensitivity of ELISA test for detecting infected animals, which plays an important role in monitoring epizootic situations for leucosis in different farms. Diagnosis of bovine leucosis using ELISA with the detection of specific antibodies in immune complexes contained in the blood serum and milk is very perspective in increasing the efficacy of diagnostic measures and eradication of this disease.

Keywords: BLV, ELISA, heat treatment, circulating immune complex, antibody.

AFRICA BIOSYSTEMS LIMITED

BAYER

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In March 2009, Assia was divested to Phibro Animal Health Corporation, an American manufacturer and marketer of Animal Health Pharmaceutical and nutrition products. During this period, the decision was taken to specialize in Animal Health products, thus the name changed to Assia Animal Health Limited in May 2009.

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Contacts: Bimeda Limited, Funzi Road off Enterprise Road, Industrial Area, P.O. Box 30620 – 00100, Nairobi, Kenya. Tel: +254 20 6537622-6. www.Bimeda.co.ke

BROOKE EA

The Brooke Hospital for Animals is a UK based international animal welfare charity committed to improving the lives of working horses, donkeys and mules in the world's poorest communities. The Brooke operates in 11 countries across Africa, Asia and Latin America through providing veterinary treatment, training and community based programs to improve animal health and welfare.

In Kenya, there are over 1.8 million donkeys, two-thirds of which play a major role in Kenya's economy especially in rural poverty reduction through transport and tillage.

The Brooke has been funding animal welfare programs in Kenya since 2001 through partnership with KENDAT in Embu; VSF-B in Garissa; Farming Systems Kenya in Nakuru; Animal Welfare and Public Health in Kisumu and Homabay; Kenya Veterinary Association in Kajiado; Vetworks in Narok and CARITAS in Kitui and Tharaka-Nithi., the Brooke is currently reaching approximately 219,000 donkeys,

In 2013, the Brooke established its East Africa regional office in Nairobi for closer management, development and further expansion, Contacts: The Brooke – East Africa, 5th Floor, Taj Towers, Upper Hill. P.O. Box 43220 – 00100, Nairobi, Kenya. Mobile: +254 700 307 709. www.thebrooke.org.

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DONKEY SANCTUARY

The Donkey Sanctuary was founded in 1969 by Dr Elisabeth Svendsen MBE. It is only through her amazing devotion to donkeys and hard work that the Sanctuary grew to the international charity it is today.

Our Mission is to transform the quality of life for donkeys, mules and people worldwide through greater understanding, collaboration and support, and by promoting lasting, mutually life-enhancing relationships. We hope to see a world where donkeys and mules live free from suffering, and their contribution to humanity is fully valued.

During the last 25 years, The Donkey Sanctuary Kenya has made profound difference to the lives of donkeys and people all over the country. This is down to the drive and beliefs of our wonderful Founder, our staff, volunteers, and of course our fantastic supporters and partners worldwide, however there is still much to do to improve the health and welfare of donkeys in Kenya. To this end we are going to provide technical support, participatory training and

educational programs geared towards enhancing ability of the communities to address and manage their own donkey welfare challenges using the local resources they have. Contacts: The Donkey Sanctuary Kenya, P.O. Box 24203 – 00502, Nairobi, Kenya. Tel: + 254 (020) 2679265

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HELB

The Higher Education Loans Board, HELB, is the leading financier of higher education in Kenya. It is a State Corporation under the then Ministry of Higher Education, Science and Technology. HELB was established by an Act of Parliament (Cap 213A) in 1995. The mandate of the Board is to disburse loans, bursaries and scholarship to students pursuing higher education in recognized institution. HELB provides affordable loans bursaries and scholarship to Kenyans pursuing higher education. Key among the responsibilities of the Board is sourcing funds, establishing, managing and awarding loans bursaries and scholarships to Kenyans pursuing

higher education in recognized institutions. Through the Act, the Board has been able to recover funds loaned out to Kenyans in the past.

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KENYA ANIMAL GENETIC RESOURCES CENTRE(KAGRC)

The Kenya Animal Genetic Centre formally known as Central Artificial Insemination Station(CAIS) was established by Kenya Gazette Notice Number 557 of 19th June 1946 with the objective of controlling venereal diseases and genetic improvement of exotic dairy cattle. The current mandate of KAGRC is to produce, preserve and conserve animal genetic material (semen embryo, tissues and live animals) and rear breeding bulls for provision of high quality disease free semen to meet the national demand for export. In order to meet its mandate, KAGRC works in close collaboration with other breeding organizations such as Kenya Stud Book, the Dairy Recording Services of Kenya and the Livestock Recording Center. Together, these organizations implement the Contract Mating and Progeny Testing Programmes. The organization also works closely with the breed societies as well as individual and institutional farms which provide herds for the breeding program.

HIGHCHEM

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VISION- To be a regional centre for life science.

MISSION- To improve health and productivity in crop science, veterinary, homecare, human pharmaceuticals and hospital consumables plus diagnostic technologies through the best practices possible. The company is committed to the provision of quality products, on time product deliveries and quality services.

KCB FOUNDATION

The KCB Foundation was established in 2007 to implement the KCB Bank Group's Corporate Social Responsibility programs and as a sign of commitment to sustainable development to alleviate poverty and enhance well-being.

To date, the KCB Foundation has invested an estimated 1Billion Kenya shillings in community programs in Kenya, South Sudan, Rwanda Tanzania, Uganda and Burundi. As a good corporate citizen, the KCB Bank Group is committed to sustainable development, prosperity and poverty reduction to address the hardship, high poverty levels and interconnected challenges that affect communities in Eastern Africa.

The KCB Foundation programs are designed to address issues of relevance specifically within the thematic areas of Education, Enterprise Development, Health, Environment and Humanitarian Intervention. The programs are customized in each of the KCB countries to ensure that they are answering to the relevant development priorities.

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Its modern, superior, high yielding, fast maturing, disease resistant wide array of seed varieties have become a boom among farmers across the region. The seed department works round the clock to ensure farmers have seeds that boosts yields and income.

This has been complemented by a host of game changing farm technologies that are redefining agriculture especially among smallholders. Elgon's miniature irrigation kit (kadogo drip kit) and greenhouse sheeting materials ensures that farmers can produce food round the year without relying on rainfall.

Elgon has rolled out plant clinics where farmers to meet with researchers and experts with a view to exploring problems areas and finding lasting solutions. Elgon's farmers award scheme, the National Farmers Awards now in its sixth year has created soil celebrities and enticed more into farming.

Elgon has forged strategic partnerships with respected global brands including BASF, Dupont, Arysta and Excel Crop Care, Bayer, Syngenta. And in a bid to respond to growing market demand for livestock products, we recently launched the animal health department and partnered with The Netherlands based Interchemie, a global powerhouse in animal health as the sole distributors in Kenya.

Elgon Kenya also unveiled a first of its kind information center equipped with agronomists & Vets who address farmers' concerns by answering their questions and advising them on the best options in their ventures. To complement this hub, Elgon also rolled out a 24/7 online information center that allows customers to place their orders online at the click of a button.

ULTIMATE VETSERVE LIMITED

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WELTTIERSCHUTZSTIFTUNG

Welttierschutzstiftung (WTS) is a charitable foundation, established in 2015 by Welttierschutzgesellschaft e.V. The foundation promotes animal welfare worldwide. The main focus of its work lies on improving animal welfare through education and continuous professional development in emerging and developing countries, scientific research on animal welfare, raising awareness towards animal welfare in society and the search for solutions to a global animal-friendly future.

The foundation acts in conducting own projects and promoting external projects.

The foundation's main program is VETS UNITED, an international educational program for animal health professionals. The program currently develops in terms of expansion of countries, target groups and capacity development of local partners. WTS programs are geared towards been effective and sustainable. With regard to raising awareness and identifying successful approaches for animal welfare in development cooperation, WTS initiates collaboration with other NGOs and the public sector both in and outside Germany.

In Africa Welttierschutzstiftung (WTS) is present through the VETS UNITED program in The Gambia, Malawi, Tanzania and Uganda and in the process of opening projects in Liberia and Rwanda.

VETS UNITED works closely with local universities, colleges, ministries and NGOs

To support the development of a suitable and effective training VETS UNITED created extensive Animal health and welfare training material which is offered for free online

After the initial implementation of the training the local partners take over the conduction of the training and integrate it into existing structures (curricula/training schedules)

In addition, in the Gambia and Malawi VETS UNITED runs a scholarship program

KENYA MARKETS TRUST

Kenya Markets Trust (KMT) is a trusted advocate with a knowledge bank of experience delivering transformational sector change through a market development sector approach.

We are a Local not for profit organization fully invested in Kenya since 2011 – a long term independent institution with deep local understanding

We act as an influencer, through trading in knowledge, trust, opportunity and innovation in order to eliminate gaps in value chains in a sustainable way

- We seek to secure a comprehensive knowledge of the sectors, then build capacity for stakeholders, introduce them to opportunity, broker profitable partnerships, leading to sustained sectoral change
- We cement behavioral change amongst both public and private sectors, to generate stronger, more inclusive, and faster growing sectors

KENYA VETERINARY BOARD

KVB was established to regulate veterinary profession and education in 1953 during the colonial government. KVB only regulated veterinary surgeons until the advent of the Veterinary Surgeons Veterinary Paraprofessionals (VSVP) Act, 2011. Besides regulating veterinary paraprofessionals the VSVP Act mandates the Board to exercise general supervision and control over veterinary training, business, practices and employment of veterinary surgeons and veterinary paraprofessionals in Kenya and advice the government in relation to all aspects thereof.

The objective of the regulation is to safeguard animal health and welfare, promote human health and protect the economic interest of the public.

VETCARE AFRICA

Vetcare Kenya Ltd was established in the year 1992 with the noble objective of manufacturing Quality Veterinary pharmaceutical products and Animal Health Nutraceuticals for both local and export markets. Vetcare Kenya Ltd is a fully owned local incorporated company in Kenya, which started its operations as a small organization but has exponentially grown over the last two decades to its current annual production capacity of 1 million liters of anthelmintic preparations, 1,200 tons of animal mineral supplements and 500 tons of Veterinary soluble powders.

Vetcare Kenya Ltd boasts of a modern state of the art manufacturing facility with a well equipped Production and Quality Control departments as per WHO cGMP standards

and is managed by qualified and experienced technical staff in Production, Quality Control and Quality Assurance along with a team of expert technicians and professionals. The manufacturing facility is GMP compliant and is licensed by Veterinary Medicine Directorate (VMD).

Vetcare is involved in the manufacture, importation and distribution of the products under the brands “Vetcare”, “Cibus” and “Alfavet”. We have established a strong presence in the market of animal health products and today we are one of the most trusted and leading suppliers of animal healthcare products in East African and COMESA regions, and have now adopted Vetcare Africa logo for the ever expanding Africa market. Our range of pharmaceutical products and animal health nutraceuticals include Dewormers, multivitamins, antibacterials and mineral supplements presented in various formulations as injectables, oral powders, oral liquids and mineral licks blocks and powders.

BRITAM

Britam is a leading diversified financial services group, listed on the Nairobi Securities Exchange. The group has interests across the Eastern and Southern Africa region, with operations in Kenya, Uganda, Tanzania, Rwanda, South Sudan, Mozambique and Malawi. The group offers a wide range of financial products and services in Insurance, Asset management, Banking and Property.

- Our Mission : providing you with financial security every step of the way.
- Our Vision : To be the leading diversified financial services company in our chosen markets across Africa.
- Our Values : Respect , Integrity ,Innovation and Customer focus.

We aim to provide our clients, with an unmatched offering, ensuring first class solutions that help secure the future.

EAGLE VET KENYA LIMITED

Eagle Vet Kenya Limited is a private company that was incorporated in 2004 . The principle business involves importation, distribution of Veterinary Pharmaceuticals, annd manufacture of vitamins, mineral premixes and other feeds additives. We focus on increasing the business in our key markets through inorganic growth routes.

We keep a coordinated efforts between market research and new product development to ensure continuous flow of new products that are backed by profound brand building efforts in every country we operate across East Africa, ensuring sustained growth in volumes and margins with wide range of different formulations in all major segments.

Every project is a privilege and our team will compromise nothing to provide quality, efficient and unparalleled experience. Our plans are modified and reviewed in our business strategy and are made as an ongoing process as we strive to emerge as the leading player in East African markets with high quality innovative formulations and domestic brand segments

MEDISEL KENYA LIMITED

For over 20 years, Medisel Kenya Limited has positioned itself as one of the fastest growing and most capable of the regions pharmaceutical, surgical and healthcare good suppliers, distributors and marketers.

Part of the Dawa Group of Companies, Medisel (K) Ltd. has an annual turnover of more than \$20m, a milestone first achieved in 2012. The company ranks as one of the top 5 pharmaceutical companies in Kenya. With over 200 employees, Medisel (K) Ltd. has maintained one of the most commendable growth stories.

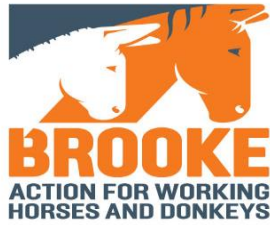
The company offers and distributes over 500 pharmaceutical, surgical and veterinary products of utmost quality and also markets a wide range of hospital equipment furniture as well as allied and diagnostic products.

Specialising in distribution, marketing, and export as well as import, Medisel (K) Ltd. has a significant presence in Africa, in countries like Kenya, Rwanda, Zambia, Malawi and Uganda. It also has liaison offices in the emerging markets like India and China.

TWIGA CHEMICAL INDUSTRIES LIMITED

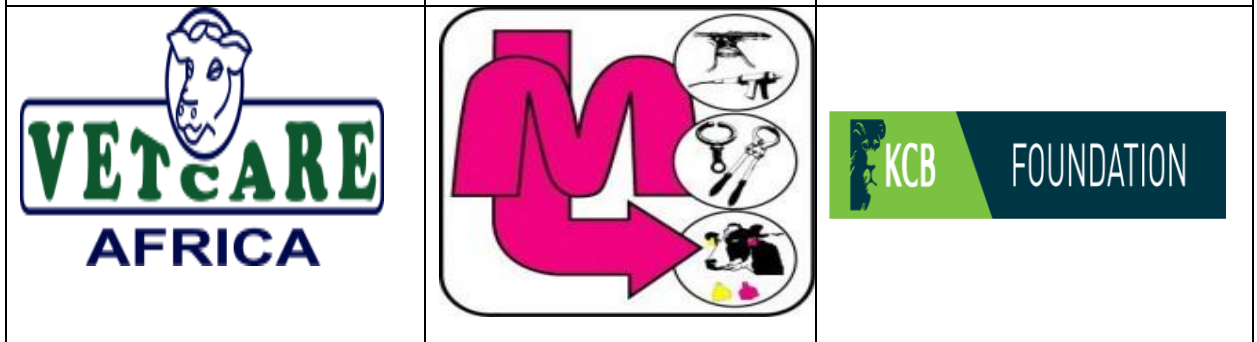
We are one of the leading companies in Africa. We are involved in the distribution of **crop protection, animal health, consumer products and explosives**. Twiga Chemical Industries Ltd is managed and operated by a team of highly qualified and experienced managers overseeing its continued growth. We are currently ISO 9001:2015 certified





Twiga Chemical Industries Ltd began as African Explosives and Chemical Industries (AECI) EA Ltd on 18th May 1949, when it was in cooperated. At the time, it was a subsidiary of the Imperial Chemical Industries PLC (ICI), UK.



Cosmos Cares...for Better Health





 <p>Britam With you every step of the way</p>	ELGON KENYA LIMITED	 <p>AFRICA BIOSYSTEMS LIMITED</p>
 <p>ThermoFisher SCIENTIFIC</p>	 <p>CHEMICALS</p>	