KYEEMA FOUNDATION

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INTERNATIONAL RURAL POULTRY CENTRE

Supplementary feeding of *Moringa oleifera* as a vitamin A supplement for village poultry during the dry season in Singida district Tanzania

The preference for local chicken meat has triggered smallholder farmers to put more effort into raising local chickens for income generation, making the system important for rural household economy. Formerly the productivity of the sector was very low, as farmers were not prepared to invest in keeping poultry due to periodic occurrences of diseases such as Newcastle disease (ND) that would devastate their flocks. With control of ND through the use of I-2 thermotolerant vaccine coupled with frequent training on poultry husbandry, farmers are now more involved in the enterprise.

The Phase 2: Regional ND Control Project, funded by AusAID and implemented by the KYEEMA Foundation in collaboration with national and district governments, has been supporting ND control activities in Singida Rural district. The project has been successful in controlling the ND outbreaks in five pilot villages and, based on that success, the district government is supporting vaccination in over 75% of the villages in Singida.

The productivity of village chickens is also influenced by poor nutrition, due to insufficiency of nutrients in scavenged feed. This leads to low numbers of chickens, products (eggs and meat) and survival rate, resulting in low profitability. Therefore another challenge facing these producers is feed formulation to suit the chickens' requirement. One potential avenue for improving the system is to add a nutrient supplement such as locally-available fish meal or sunflower seed cake to the traditional low-nutrient-dense diet.

Competition between human and livestock for food is another challenge in animal feeding. In Singida, as in most areas of the developing world, farmers experience food insecurity and are unable to buy extra feed for chickens. However non-conventional feed resources are

However non-conventional feed resources are available for feeding poultry at all levels of production and these are less competitive. They include multipurpose tree leaves, ants and root crops (cassava and sweet potatoes). The challenge is how to process these resources to maintain the nutrient composition and to develop least-cost formulations that will require minimal or no addition of competitive cereals. This will improve the quality and quantity of chicken products available for consumption and sale, and thus enhance the nutrition and income levels of households.

During a visit to Singida in 2011, we heard complaints and confirmed substantial poultry mortalities due to inability to feed as a result of blindness. Affected chickens had typical signs of vitamin A deficiency with crusty material in the nostrils and eyelids, progressing to the accumulation of cheesy material. With gentle pressure, the caseous necrotic material oozes out. The condition was more pronounced in the dry season. Farmers needed a cheap source of vitamins, especially in dry season when greens are lacking. Commercial supplements are available but farmers are reluctant to buy them, due to their limited economic resources.

We noticed that there were *Moringa oleifera* trees established in one of the school yards. The villagers told us that the trees were grown to improve soil fertility and for seed production but were later abandoned because of lack of markets for the seeds. The villagers did not realize the importance of those trees in nutrition! In the literature, *Moringa oleifera* –"mlonge" is known as a miracle tree due its multiple uses. The trees are easy to grow in tropical areas and are rich in proteins, vitamins and minerals. They are a promising nutritional and economic resource in human and animal health and production and are becoming widely used in fighting malnutrition.

Studies in poultry have reported that *Moringa* leaf meal serves as protein source and also provides some necessary vitamins, minerals and oxycarotenoids. The average unit composition reported is summarized below.

In this issue

NUTRIENT	AMOUNT
Crude Protein (%)	27.51 – 29.7
Crude Fibre(%)	19.25 – 22.5
Crude Fat (%)	2.23 – 4.38
Energy (MJ /Kg DM)	7.86
Vitamin A (IU)	15,620 ± 6,475
Vitamin C* (mg)	773 ± 91
Ca (mg/100gDM)	2.9 – 2.79
P (mg/100gDM)	2.6

Efforts were made to find the solution to the problem in Singida. In two project pilot divisions where many cases of vitamin A deficiency had been reported between 2009 and 2011, farmers were advised to use *Moringa oleifera* as an ingredient in their supplementary feeds. During training conducted in November 2011, farmers learned the importance of using the Moringa tree as a cheap source of vitamin A and other nutrients, and using it as feed ingredient supplement in poultry diets. The villagers learned how to harvest the leaves, air-dry them under a shed until they were crisp to touch but still green, and preserve the dried leaves for use during the dry season. other nutrients, and using it as feed ingredient supplement in poultry diets. The villagers learned how to harvest the leaves, air-dry them under a shed until they were crisp to touch but still green, and preserve the dried leaves for use during the dry season.

***Moringa olifera* flowers, leaves and fruit with seeds**

In an evaluation done one year later very few cases of vitamin A deficiency were reported in comparison to the previous years. Although quantitative data was not collected, we could still observe that the preserved *Moringa oleifera* provided a cheap source of vitamin A and other nutrients to chickens in the dry season. The challenges remain on how to incorporate *Moringa* in the feed formulation and calculate actual quantities to be consumed to take care of any potential deficiency. *Moringa* leaves can improve the nutritional status and combat vitamin A deficiency in local chickens in Singida. There is a need to have more scientific evidence on this issue. Let's share!!!

Resources

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Maintaining the cold chain for vaccines in veterinary medicine

Vaccines are biological products and excess heat, cold or light, or fluctuating temperatures can affect their potency. This is significant because a loss in potency or activity can result in inadequate immunity in the vaccinated subject. This can lead to failure of 'herd immunity' and subsequent outbreaks of disease in seemingly vaccinated animals. Without proper monitoring and evaluation of the cold chain it is difficult to determine whether vaccination failure is due to cold chain problems or other factors. Unfortunately, there is very little field research assessing cold chain maintenance in the literature at present.

The World Health Organization (WHO) has developed guidelines for vaccine storage and recommends the range of 2 to 8 °C for vaccine storage, and ideally 'strive for 5'. There are two main types of cold chain: the 'conventional cold chain' and the 'non-conventional cold chain'. The 'conventional cold chain' includes vaccine refrigerators, cold rooms, domestic refrigerators, and insulted boxes with icepacks used for transport of vaccine. The 'non-conventional cold chain' includes storage of vaccine in cool places in a home, such as next to a water pot, or field transport wrapped in a damp cloth in an open-weave basket.

This report discusses maintenance of the cold chain based on data collected in the veterinary laboratory in Lubango, Angola. A data logger was used to record temperatures in the vaccination storage refrigerator, and minimum/maximum thermometers were used to assess the effectiveness of various cool pack storage methods for field transport of vaccine.

Use of domestic refrigerators for storage of vaccines

Domestic refrigerators are not ideal for vaccine storage because they are not designed to maintain temperature within the recommended 2 to 8 °C range for vaccines. They have cooling and heating cycles, temperatures vary from shelf to shelf, and temperatures in some locations such as near the cooling plate can reach freezing point. Domestic refrigerators are most commonly compressor refrigerators (such as cyclic defrost, frost-free and bar refrigerators). Absorption refrigerators work differently and use a source of heat such as combustion of gas, solar thermal energy or electric heating elements. The refrigerators that use gas or solar energy can be beneficial in areas where the electricity source is unreliable.

The data obtained from the refrigerator in the Quality Control room of the laboratory revealed an average temperature of 10.8 °C, with fluctuations between 10.1 °C and 12.5 °C. The average temperature was even higher in the bottom drawer of the refrigerator, which was made of solid plastic and restricted airflow. On days when there were power outages, temperatures were as high as 23 °C. Once this was recognised, steps were taken to investigate the high temperatures. The electric motor driving the internal fan in the refrigerator was not working and needed to be replaced. The generator supplying electricity during power outages was also not working.

As the refrigerator tends to fluctuate approximately 2-3 °C in a cycle, it should be possible to maintain a temperature between 2 and 8 °C if the thermostat is adjusted appropriately and the electricity supply is constant. If using a domestic refrigerator for vaccine storage, it is essential to monitor minimum and maximum temperatures daily in order to identify when problems occur.

Effectiveness of various cool pack storage containers for field transport

When using cool packs or cold boxes for vaccine storage, cold mass is essential. Different types of cold mass including commercial ice packs, frozen salt water and frozen fresh water were compared. Frozen salty water and frozen fresh water were comparable, with temperatures from -4 °C to 20 °C over 24 hours. Ice packs kept the cold boxes or cool packs coolest with temperatures from -7 °C to 10 °C over 24 hours. This is most likely due to the shape of the ice packs and the ability to pack them tighter. Comparison between a soft cool pack and an insulated cold box with the same cold mass showed the cool pack to hold temperature between -2°C and 8°C, and the cold box between 0°C and 6°C. The cold box, therefore, maintained a more stable temperature.

From this information the many variables to consider when packing vaccines for field transport are highlighted. These include the type of cold mass, number of cold mass units, size of the cool pack or cold box, method of packing, ambient temperature and time to destination. Even more important is the need for conditioning of the cold mass to prevent the freezing temperatures seen at the beginning of each experiment

Conclusion
Maintaining the cold chain for vaccines is extremely important. However, the cold chain is generally poorly monitored in practice, especially in veterinary practice. It was of great interest to study this topic and I hope to gain some data from veterinary practices in Australia to compare to data from Angola.

Assessment
I am glad to have had the opportunity to travel to Angola and work as a volunteer with the KYEEMA Foundation project. Lubango was a beautiful place with friendly people, and different from any place I have travelled before. Even in my short stay I gained a lot of insight into the challenges of working in a developing country, for example language barriers, other communication barriers, fiscal issues, differing opinions, coordination with other industries in-country, difficulty in obtaining infrastructure and supplies, and relationships with partner organisations, government and community. Despite the challenges, it was easy to see the benefits of the work being done and the progress that was made during my time in Lubango. Improvements in agriculture for food security are becoming increasingly important worldwide, and I was grateful to be part of a team working towards an important goal.

Jessica Privett

High risk practices in the production and marketing of Muscovy ducks for transmission of highly pathogenic avian influenza in Indonesia

In 2009, I conducted a small project which focused on risk factors for environmental contamination with highly pathogenic avian influenza (HPAI) in rural farms and live bird markets in Central Java, Indonesia. The study was descriptive in design and involved 30 semi-structured interviews with farmers and 20 interviews with vendors and collectors at live bird markets to examine production and marketing systems. The study focused on Muscovy ducks, which have been implicated as a high risk factor for environmental contamination with HPAI.

Data collected included type of poultry production system (intensive vs. semi-intensive vs. extensive), types of birds raised and traded by a particular farmer or vendor, contact between Muscovy ducks and other types of poultry and wild birds, and amount of veterinary care for the poultry. The study was performed in cooperation with the Public Health Department of the Veterinary School at Universitas Gadjah Mada (UGM) in the city of Yogyakarta.

Most farmers did not see a significant benefit in raising Muscovy ducks, as they are not part of the regular diet of Indonesians. However, raising Muscovy ducks served as a hobby and a form of financial savings. All market vendors and collectors traded multiple species of birds with Muscovy ducks only comprising a small proportion of total birds traded. The Muscovy ducks rarely received veterinary care, though vaccination services and disinfectants were offered by the government. Only 40% of farmers vaccinated their Muscovy ducks and only a few knew of HPAI. Cleaning practices were inconsistently performed.

Because the HPAI virus (H5N1) can be spread via fomites, encouraging proper hygiene with regular cleaning of enclosures and surrounding areas is important in preventing transmission of disease. Additionally, public health veterinarians should raise awareness about zoonotic diseases and promote veterinary services in rural farm communities.

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Kyeema supports an Australian Youth Ambassador for Development (AYAD) – dairy development in Kenya

Volunteer quick facts

Qualifications: Bachelor of Commerce, Hons. In Economics

Previous employer: Department of Primary Industries Victoria - Ellinbank (national dairy research centre)

Host organisation: International Livestock Research Institute (ILRI)

Duration: 12 months

It's an exciting and unnerving time starting a twelve month volunteer placement. There are inspiring ideas on how to make a contribution on the one hand and an uncertainty of what will make an impact on the other.

This year the Australian Government will support more than 1800 skilled volunteers to live and work in developing countries through the Australian Volunteers for International Development program, an AusAID initiative.
Having recently arrived in Kenya, I will share with you a few on how I have prepared for the challenge of contributing to the development of the Kenyan dairy industry.

The Kenyan dairy industry, from my limited understanding, has a range of farm operations including well-resourced commercial farms with 100+ head of cattle, and small holder mixed/subsidence farms with approximately 3 cows. Industry limitations include: knowledge around the management of water, feed, animal husbandry and hygiene; cultural traditions around cattle; systems and resources for disease management; infrastructure (roads and refrigerated transport for example); and the economics of processing milk in a price sensitive market with vast supply fluctuations. This brief list gives a sense of how different the issues are from Australia.

Looking at the industry's limitations and the cultural context it is hard to know what a fully developed dairy industry would look like, let alone contribute to the realisation of such a vision. Questions that I have mused on over the past three months in preparation include: Will my understanding of the Australian dairy industry and farm practices translate to a Kenyan context? Will I be able to implement my expertise on value-chain assessment, competitiveness assessment, farm benchmarking, and green-house-gas mitigation? What is already happening in the Kenyan dairy industry – phone applications are being used, for example, to provide farm management reminders as well as market prices. And, will I be able to pronounce the word "ng'ombe" (cow)?

Reading current literature on East African dairy has helped with these questions to an extent, as has practicing not swallowing my tongue while saying ng'ombe. One of the most valuable factors, though, that will support me in this challenge is in my newly found mentors, John Moran and Allen Vaughn (tropical dairy experts) as well as the core KYEEMA team – John, Robyn and Mary.

This is a new direction for both KYEEMA and myself, something we will all work hard at to make a success.

The AYAD Program is the youth stream of Australian Volunteers for International Development, an Australian Government, AusAID initiative which deploys skilled volunteers to live and work in developing countries as part of the overseas aid program

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