

Goat Farming in Uganda: Investigating Gastrointestinal Parasites and their Impact

Agriculture plays an important part in the development of third-world countries, and the role of vets in establishing sustainable farming systems has interested me for some time. This summer, thanks to the support of Intervet and the British Veterinary Association, I was able to spend a month in Jinja, in the Busoga district of Uganda working with Gideon Nadiope, a local vet, to investigate gastrointestinal parasitism in the local goat population.



In Uganda goats have traditionally been viewed as socially inferior livestock to cattle, but in recent years their potential as an affordable means of facilitating a move away from subsistence farming to a more commercial form of agriculture has been recognised. To speed this process, goats have been improved with imported genetics, which has resulted in a significant increase in productivity and value. However goat-keepers continue to experience problems with illthrift and disease, attributed to high parasite burdens.

There are many reasons for this. It is widely believed that local goat breeds have innate resistance to many parasites and other infectious diseases, and that this is being lost as new blood is introduced. Parasite control strategies are often haphazard, and this is exacerbated by a general lack of veterinary input and the absence of data on the epidemiology of parasite infections in Ugandan goats on which to base these. Anthelmintic choice is largely governed by price, and only drugs from the benzimidazole group and levamisole are widely available, which may in time contribute to the development of anthelmintic resistance.

My study aimed to address some of these issues. In order to quantify and characterise the gastrointestinal parasite burdens, and to evaluate the effectiveness of control measures being used, I collected faecal and blood samples from goats on smallholdings in the region. I then performed faecal egg counts (FEC) on these samples using a modified McMaster's technique, and obtained packed cell volume (PCV) and total plasma protein values for each goat.

The practicalities of this were a little more complicated. Travelling around Uganda is a hairy business. Even major roads are little more than wide dust tracks shared by trucks, women carrying fruit, children fetching water and bicycles loaded with goats, bananas and all sorts of other things. At night the challenge is to avoid the herds of cattle being walked along in the pitch black. I was quite glad that Gideon waited until the end of my stay to tell me that he has never taken his driving test. Visiting rural communities involved driving in a truck along narrow footpaths and defunct railway tracks to reach villages deep in the jungle. Much to everyone's amusement I found this off-roading particularly exciting.

Another major issue in Uganda is the electricity supply. Along with many other East African countries, Uganda is reliant on electricity generated by turbines in the Owen Falls dam, situated in Jinja, near the source of the Nile. However, changes in water level have reduced its efficiency in recent years. The outcome of this is that electricity is shared on a one day on, one day off basis, although, like many things in Uganda, this is not entirely predictable. This slowed down the processing of samples in my makeshift lab, but the irritation and inconvenience it caused

me during my short stay is nothing compared to the impact this situation has on the daily lives of Ugandans.



We were, without fail, welcomed by villagers and farmers keen to participate in the project, and if time and equipment had allowed I could have sampled many more goats. Our first day of sampling took place on Gideon's own smallholding in his home village of Kabukje, and was followed by visits to other villages in the area. In total I obtained samples from 169 goats on 6 separate smallholdings.

On faecal egg examination the most common species identified were *Haemonchus*, *Trichostrongylus*, *Oesophagostomum*, and *Strongyloides*. Of the goats tested, 42% had FECs above 1000 eggs per gram, the level which is thought to indicate a pathogenic infection. These preliminary results also suggest that, as suspected, there is a difference between the parasite egg output of indigenous goats and those improved with imported genetics.

My findings showed that whilst a low PCV may correlate with a high worm burden, a potentially clinically significant faecal egg count may be found in an animal where PCV is within the normal range. The same is true for total plasma protein values. This may be relevant in situations where farmers are using systems such as FAMACHA, where anaemia diagnosed by examination of conjunctival colour is used as an indication for anthelmintic treatment. Even in the absence of overt clinical disease, high worm burdens are likely to cause a significant decrease in productivity.

The results of the study suggested that coccidiosis may be a cause of clinical disease, even amongst adult goats. This may be especially significant in situations where goats are kept in confined surroundings and not allowed to browse. Often these cases are repeatedly treated for nematode infections to no avail.

The data I obtained was of immediate and direct relevance to the farmers whose goats we sampled, and we returned to each of the villages to present them with results and explain their significance, and every farmer saw this as an opportunity to review their approach to parasite control. In addition it was of benefit to Gideon since many of these farmers were keen to use FEC to inform their control measures in the future.

My findings form the basis of a preliminary study into goat parasites in the area that Gideon and I hope to be able to expand on next summer. Our findings also raise further questions regarding anthelmintic efficacy, and highlight the need for further research on the significance of worm burdens in goats; currently most available data has been extrapolated from findings in sheep, even though the nature of parasite infections of goats and their immune response to these is acknowledged as being vastly different.

In the UK we are now in the unfortunate position of being forced to rethink our approach to internal parasites due to the ever increasing problem of resistance. The information we have gained through this process should be used to prevent countries from Uganda from making the same mistakes, and to enable them to form sustainable control strategies that promote development of their livestock industries.

In between our goat sampling visits, I accompanied Gideon on his calls, and any illusions I had about veterinary work in Uganda being exotic were soon dispelled. The majority of the animals he sees are cattle, and a large proportion of these are Holstein Friesian-type; if I blocked out the mud huts and the banana trees it was almost like being at home. Most were cases of reproductive failure, but I also experienced the devastating reality of diseases such as East Coast Fever, trypanosomiasis and cowdriosis.

Gideon is currently studying for an MSc in livestock development was also keen to show me the progress that is being made in Uganda. In addition to visiting government farms and livestock breeding schemes, I was taken to Makerere University in Kampala, where he studies part-time. I was able to speak to vets and scientists there about their research, and gain an insight into veterinary education in Uganda.

Towards the end of my stay I caught the bus to Kumi along with about 80 other people and a dozen or so chickens. In this small town, 150km North of Jinja, Miriam Nakama runs a project that take a holistic approach towards educating and supporting children from the surrounding rural communities. As part of this project, young people, in particular orphans, are given a goat, which they must pass on once a female kid is born. We visited these communities so I could meet some of the recipients and hear both how they have benefited and the husbandry problems, many consistent with gastrointestinal parasite infection, that have been encountered in caring for the goats. Families are dependent on these animals and the development of guidelines on appropriate parasite control is crucial to the success of schemes of this type.



I benefited greatly from my time in Uganda in terms of the practical skills in clinical parasitology and experience of conducting studies in the field, but also through meeting inspiring people, and broadening my own experience of life. Uganda is an overwhelmingly beautiful, fertile country, but many ways my visit has left me with mixed feelings, as it is difficult to reconcile the poverty and hardship I experienced with western values. However, I feel strongly that we have a responsibility to share our experience and knowledge and use the advantages we have to improve this situation, and I hope that my work over the summer has contributed to this in some small way.