

Experiences with an In-Training Community Service Model in the Control of Zoonotic Sleeping Sickness in Uganda

Charles Waiswa ■ John D. Kabasa

ABSTRACT

By 2006, the acute and zoonotic *Trypanosoma brucei rhodesiense* sleeping sickness in Uganda was spreading northward, leading to fear of a merger with the chronic *Trypanosoma brucei gambiense* type that affects people in the northwest of the country. Eliminating infection in cattle was urgent because they had been confirmed to be spreading the zoonotic type, and eliminating infection would reduce the animal reservoir and subsequently reduce transmission of sleeping sickness. In this article, we describe how the staff and students of the Faculty of Veterinary Medicine, Makerere University, adjusted their approach to training veterinary students who could provide the urgently needed manpower to enable the community to halt the disease's spread. Because it was not usual for university staff and students to implement disease control activities, the government of Uganda had to delegate this responsibility to Makerere University. In turn, the university had to explore available opportunities in its training and outreach mandates. A model was developed that proved to be an effective hands-on training strategy while helping to control a disease that was threatening the health of people in a community that was just recovering from an armed rebellion. In total, 66 students and supervisors participated in the 10-week-long mass treatment activities in the target area and treated more than 190,000 out of 220,000 targeted (>86%) cattle with diminazene aceturate and deltamethrin. Also, the graduates' performance improved, as indicated by 43.5% of graduates securing employment within less than a month after completing the course.

Key words: zoonotic, sleeping sickness, control, in-service student training model

INTRODUCTION

By the end of the 1990s, the zoonotic type of sleeping sickness had spread from the traditional endemic area of southeastern Uganda toward the northern part of the country. By 2002, the spread had been associated with cattle reservoir and restocking exercise,¹ leading to the fear that *Trypanosoma brucei rhodesiense*-affected areas would merge with the *Trypanosoma bucei gambiense*-affected areas because Uganda has both types of the disease. Several studies had confirmed the fear that cattle were reservoirs and were responsible for the rapid spread of the disease.²⁻⁴ Uganda is the only country that is affected by both acute (*T.b. rhodesiense*) and chronic (*T.b. gambiense*) types of sleeping sickness, and by 2005 these two diseases were described as being separated by only a thin line.⁴

The merger of the two types of sleeping sickness would lead to delays in deciding on a treatment regime because DNA-based technologies would be needed to confirm the type of sleeping sickness before treatment could be initiated. This possibility necessitated handling the potential merger as an emergency and doing something to reduce the spread of the zoonotic *T.b. rhodesiense*. Because cattle had been blamed for the epidemic, the entry point in containing the spread was to use trypanocidal drugs like diminazene aceturate that had proven effective in treating *T. brucei* infections in cattle.⁵ In addition, the live bait technology in tsetse control had been documented as an ideal tool in the control of *Glossina fuscipes*

fuscipes,⁶ which is the major vector for sleeping sickness in the *T.b. rhodesiense*-endemic areas of Uganda⁷—areas in which there are adequate cattle numbers. The major challenge was the huge human resources needed because the problem involved an area in which public extension services had been destroyed by war. The Faculty of Veterinary Medicine (FVM) of Makerere University was assigned responsibility for responding to this need. Makerere University's mission is to capacitate people, empower communities, and foster sustainable development with the goal of improving the well-being of Ugandans and sustainable economic growth,⁸ which provided the perfect opportunity to deal with this public health problem. In this article, we document the steps leading to the development of an In-Training Community Service (InTracs) model that enabled the faculty staff and students to respond to an emergency and helped reduce the threat of the merger of the acute and chronic sleeping sickness in Uganda under a program named "Stamp Out Sleeping Sickness" (SOS).

METHODOLOGY

A meeting was held in Entebbe that resulted in the proposal that the FVM's human resources were those most suitable to use in the intervention that would involve targeting treatment and spraying 220,000 cattle with diminazene aceturate (Veriben B12) and deltamethrin (Vectocid).^a

Target Intervention Area

Five districts, all located in northern Uganda, were selected for SOS phase 1: Kaberamaido, Dokolo, Lira, Amolatar, and Apac, all lying on the immediate north of Lake Kyoga. All the districts were located more than 400 km from the FVM in Kampala.

Mandate

Interventions for disease control had not previously been perceived as a role that could be performed by a university such as Makerere where an academic mission predominated, and it was assumed that the Ministry of Agriculture was responsible for providing front-line field extension staff. However, the northern Uganda community was just recovering from an armed rebellion, and the community had challenges in public service delivery. The stakeholders agreed in principle that students and staff of Makerere University were most suitable in terms of the expertise and manpower needed to implement the strategy, and so the government delegated this role to the FVM. Subsequently, the various stakeholders signed a memorandum of understanding in which the assignment delegated to Makerere University was documented; this served as the authority¹ that enabled further development and refinement of the model that was used.

Engagement of the Private Sector

The resource envelope had to be guaranteed before any major adjustments in the university timetable could be accepted by university management. Ceva Santé Animale (CEVA)/Industri Kapital (IK) accepted responsibility to provide enough trypanocidal drugs and deltamethrin to treat all of the cattle in the target area. Through their local representative, Coopers Uganda Ltd., plans were made to import enough supplies, including but not limited to drugs and equipment such as pumps, syringes, needles, t-shirts, jackets, and hats that later became identifying clothing for the Makerere brigade teams. The operational funds from CEVA/IK were transferred to the Makerere University account two weeks before departure to the field.

Curriculum, Timetable, and Fitting of the InTracs Model

In 2006, the new Bachelor of Veterinary Medicine (BVM) curriculum was in its fourth year of implementation and was due for review in the fifth year, which provided time for review and assessment of the new innovations that InTracs was providing. The review was expected to enable Makerere University to produce veterinary graduates able to address community's needs. At the same time, studies and media reports at different times indicated dissatisfaction with some of the practical capability of the university graduates, including those from Makerere. The SOS opportunity presented itself at a time when several user-friendly and affordable options were being considered.

Under the new approach, two months were devoted to providing a service while training students in the sleeping sickness-affected communities of northern Uganda. This approach would effectively work as an internship attachment for the BVM students' final year and was regarded as the transitional period that could interface with communities that most needed both human and animal health services.

In the following academic year, 2007–2008, the model was tried again in a community in which sleeping sickness cases were persistently being reported. Thirty-six thousand head of cattle were to be treated in a one-month period using half the human resources available in 2006. Territories were given to each group of six people, and they stationed themselves in the same area to be able to answer questions related to sleeping sickness control.

Organization for Field Work

Teams were arranged in groups of five to six, providing a total of eight teams for the 46 students who were available in the BVM final year of 2006. The teams were called *brigades* and took instructions from one command structure. Internal discussions of most of the issues were encouraged before they were shared with the community because many of the students and staff had limited knowledge of the northern Uganda environment, particularly because this region was just recovering from an insurgency.

InTracs Model Management Structure

The FVM management committee was the overall governing body and made all decisions related to InTracs and later forwarded them to the university management as information. A coordinator appointed by the governing body coordinated the day-to-day activities and was the link to the different stakeholders in both the public and the private sectors. Each of the five to six brigade teams was supervised by an academic staff member who was responsible for giving tasks, evaluations, and student assessments on a daily basis. Each brigade had a student leader who linked the group to the lecturer in case there were issues related to accommodation, meals, abnormal behavior, group members' health status, and so forth. At least one member of the group was well versed in the local language and culture to facilitate communication while carrying out activities with the local people in the different community settings.

Standard Operating Procedures, Restricted Application Protocol, and Division of Brigade Teams

The introductory briefs in the field preceding the campaign were important because they helped the students refine their knowledge of the techniques to be used. In the SOS mass treatment, review of body weight estimation, drug doses, and routes of administration was conducted by different specialists. Although animal restraint is extensively covered in the first year of the course, this subject also had to be revisited to refresh the students' and animal handlers' understanding of the approach and risks involved to maximize their safety.

By the end of the second week, the standard operating procedures (SOPs) were well known by all participants. These included, but were not limited to, waking at 6:00 a.m., mixing the drugs, packing the amounts of diminazene aceturate and deltamethrin that were estimated to be required for the day, eating breakfast, and re-confirming with the community mobilizers and local leaders. While in the field, a brief would be given by the group member who knew the local language and was also provided in English where applicable. Restraint and

the importance of treating the farmers handling animals as team members were explained and always agreed on before the start of the treatment and spraying. All farmers were introduced to the concept of restricted application protocol (RAP) using deltamethrin (Vectocid), in which the most common sites for the tsetse and ticks are sprayed.⁹ At each site, two of the cattle owners were trained in RAP and helped in spraying the animals. Once the SOP was known to all (supervisor, students, and drivers), each team was split into two sub-teams of three people each, which almost doubled the number that each group was covering in the initial two weeks, which enabled mobilization of two sites per parish and also made it easy for the farmers to access the mass treatment services.

Monitoring of the Activities

This model had to be monitored by a government body, the Coordinating Office for the Control of Tsetse and Trypanosomiasis in Uganda (COCTU), under the secretariat for the Uganda Trypanosomiasis Control Council (UTCC). This body monitored the SOS activities to ensure that the objectives were being achieved. COCTU also received data on the occurrence of sleeping sickness in the target area to ensure that the spread of the disease northward had been halted. Similarly, the University of Edinburgh was on the ground to monitor coverage and take blood samples from cattle together with the university students. These samples were later analyzed to confirm the achievement of trypanosomiasis control in the animal reservoir.

Modifications in the Model During Retreatment

During the first InTracs SOS activities between September and December 2006, all teams were deployed in one district and would be moved after adequate coverage of the cattle in the district. This allowed teams a maximum of only two weeks per district, which left little time to discuss with the community false statements and rumors.

In the re-treatment exercise between April and May 2008, a decision was made not to move the teams and instead allocate them to specific areas of operation and to have a brigade based where they would remain for the entire one-month period of the exercise. The community was assured that the teams would be available for at least four weeks and would be open to handle any animals that became sick during the exercise. To be specific, the coordinator said, "We shall compensate for any animal proved to have died from the drugs administered and we request that any such suspected cases be reported as soon as they became ill after the exercise." After one week, all teams had no recorded complaints, which continued until the exercise was complete.

Focus Group Discussions

Because the veterinary students and staff were undertaking a major intervention in northern Uganda for the first time, much discussion and explanation was provided for the students and the community before the treatment and spraying of cattle was started. Focus group discussions were carried out within the university and thereafter with selected members in every sub-county of the intervention area. After the exercise, the process was repeated to capture important views that would help guide the future interventions.

RESULTS

A total of 66 students and staff participated in the intervention exercise of the 2006–2007 academic year (Table 1), and an additional 36 students and staff participated in the re-treatment exercise of the 2007–2008 academic year (Table 2). Female participation in the model during the retreatment increased and was mainly the result of the increased number of final-year female students in 2007–2008.

Number of Cattle Treated and Sprayed

Table 3 gives a summary of the number of cattle involved in the treatment and spray exercises. In 2006, 190,688 cattle were treated during district campaign in the villages of the five districts of Kaberemaido, Dokolo, Amolatar, Apac, and Lira. Participation in many villages was 100%, and the teams were able to manage huge numbers of cattle.

Initial Treatment Notes An additional 1,912 cattle were treated at market (Ochero, 720 cattle; Otuboi, 632 cattle; Cwagara, 560 cattle). The 1,912 animals treated in the markets are not included in the percentage calculations because animals in the market were sometimes from districts other than the targeted area. Additionally, 405 pigs were treated at Ochero market and surrounding villages, all in Kaberemaido district.

Re-Treatment Notes Total cattle re-treated included 10,820 in Dokolo and 20,666 in Kaberemaido, for a total of 31,486 cattle treated in the fourth spray and re-treatment exercise. This represents 91.3% (31,486/34,474) of the animals expected, assuming that the 20% increase in the actual number of 28,728 is a good estimate.

Monitoring Team Reports

No cases of sleeping sickness were reported in Lira in 2007,¹⁰ which indicates that the spread of the disease

Table 1: Participants in the initial InTracs activities (September–December 2006)

Participants	Male n (%)	Female n (%)
Supervisors	16 (80)	4 (20)
Students	44 (95.7)	2 (4.3)
Total	60 (90.9)	6 (9.1)

InTracs = In-Training Community Service.

Table 2: Participants in the InTracs re-treatment activities (April–May 2006)

Participants	Male n (%)	Female n (%)
Supervisors	10 (100)	0 (0)
Students	19 (73.1)	7 (26.9)
Total	29 (80.6)	7 (19.4)

InTracs = In-Training Community Service.

Table 3: Number of cattle treated under the InTracs intervention

1st intervention in 2006			Retreatment in 2008		
District	N cattle targeted (%)	N cattle covered (%)	District	N cattle targeted	N cattle covered (%)
Kaberamaido	28,637	28,930 (>100)	Kaberamaido	16,919	20,666 (122.2)
Dokolo	126,326	37,039	Dokolo	11,809	10,820 (91.6)
Amolatar	(114,921/126,326 = 91% covered)	39,623	No retreatment because there were no reports of new cases of sleeping sickness in Amolatar, Lira, and Apac districts		
Lira		37,649			
Apac	54,858	46,837 (85.4)			

InTracs = In-Training Community Service.

northward was halted and a whole district was reclaimed from the threat of sleeping sickness.

Similarly, a 70% reduction in *T. brucei* s.l. infections in cattle was reported by the monitoring team from the University of Edinburgh.¹¹

Performance of the Graduates (2006–2007 Brigades)

After the Course

Students excelled in their practical and oral examinations, and 100% passed their examinations in the 2006–2007 academic year. A total of 11 students found employment in the private sector within a month after the course, and nine were employed in the public sector. Thus, 43.5% (20/46) students were employed in the public or private sector within a month after finishing the course.

Feedback From the Community Engagements (Focus Group Discussions)

The various stakeholders had initial concerns about the approach. However, some statements, such as this one, helped to minimize these concerns:

The SOS exercise took on a participatory approach in which the cattle owners were at the center of tsetse and trypanosomiasis control and they not only supplemented our efforts with material ranging from ropes, pumps and crushes, but also actively participated by restraining the animals and spraying. (Dr. Peter Chelli, DVO, Kaberemaido district)

For the first time, many of the students appreciated that apart from the threat of war, the SOS areas offered opportunities for an enjoyable veterinary public or private practice. “The cattle owners welcomed us well at the different sites where we were to do the work. In fact, at the sites a goat or chicken were slaughtered for the group which was a routine for lunch” (Dr. Roy Mwaka, now working as a sales representative with Quality Chemicals).

The gaps in animal health service delivery were clearly seen by the brigades because some districts such as Amolatar and Dokolo had only one veterinary officer and only one or two additional animal husbandry officers who doubled as the assistant district veterinary officer. “I made a decision to start mobilizing resources to set up

a veterinary drug shop and private practice in Amach sub-county, Lira district, which is my home area as there are very few veterinary drug shops in this place” (Dr. Podopodo, a former brigade participant now involved in private veterinary practice in Lira district).

Many students learned that farmers will listen to ideas and use them to improve the health and management of their animals.

According to Dr. Kayondo, a former brigade member,

With the experience I got in the SOS mass treatment, I will go and establish myself in Luwero and start making extension visits to the farmers in the rural areas. Although I have been employed by an agro-chemical company (Mussajjawaza) in Kampala, my focus is establishing my own vet drug shop and setting up a private practice in Luwero district.

He has now established a veterinary drug shop in Luwero and is using the community engagement skills attained during the mass treatment in the SOS area.

Finally, one of the facilitators of the focus group discussions (Dr. Savino Biryomumaisho, Senior Lecturer, Department of Veterinary Medicine and one of the brigade supervisors) noted that “SOS offered the best approach to students’ practical training in the lecture-free year and it gives enough time for the supervisors to observe the students as they work which guides the assessment process and award of marks.”

DISCUSSION

By 2005, *T.b. rhodesiense* sleeping sickness was rapidly spreading to areas in Uganda previously not known to be affected and caused concern that it would merge with the *T.b. gambiense* sleeping sickness in affected areas.⁴ The disease spread happened at a time when the veterinary and public health services were greatly inadequate in northern Uganda, which was just recovering from armed rebellion. Moreover, the ability of health organizations in developing countries to expand access to quality services has already been reported to depend in large part on organizational and human capacity, including professional development of staff, and on efforts to create

working environments conducive to high levels of performance.¹² Engagement of the staff and students of Makerere University in helping control the disease that was threatening the lives of people in northern Uganda proved to be a viable alternative that should be copied by other community service providers. It is encouraging that, by using this model, 85% (39/46) of the participating graduates expressed interest in continuing to work in the SOS area of northern Uganda, which is an indicator that the approach not only helped to reduce the spread of sleeping sickness, but also provided the opportunity for the university graduates to realize the many roles they can play in improving the community. Within six months after their graduation in January 2008, five graduates had already established private veterinary practices to serve the community in the SOS area, a service they have continued to render to date.

During this exercise, assessment and award of marks was based on student performance on the different aspects of the project, giving students the opportunity to improve in areas in which they were weak because lecturers mentioned observed weakness each day. The ultimate benefit was that the students excelled in their practical and oral examinations, and all passed their examinations in the 2006–2007 academic year. More impressive was that 43.5% (20/46) became employed in the public or private sector within a month after finishing the course. Moving training from the previous theoretical approach to real-life experiences in the private sector helped the students to understand their ability to help communities in developing countries by providing the urgently needed human resource required to solve community problems.

Sustainability of these control activities is a major issue, particularly because a logistical system must be created that can ensure that the supply of the chemicals used in communities more than 400 km from the major distributors. According to observations during the implementation of the mass treatment exercise, rural areas of northern Uganda had not been attractive to business companies looking to create agrochemical supply chains.

The model described here was built using resources from the private sector with the goodwill of the public sector, and the FVM was able to provide the student manpower required to help the community during the course of the academic lecture-free year. The challenge currently is how to interface with the different professionals to have a means of training community-responsive veterinary students in a variety of interprofessional collaborations. As already suggested,¹³ all future health care professionals should be trained in innovative interprofessional problem solving, the art of thinking outside the box, and the importance of responsiveness to community needs. These health professional students' collaborative efforts are vital for the continual improvement of any nation's health care system in the twenty-first century. Therefore, as a model targeting training of students while serving communities in very remote areas, the equipment needed must be available in adequate quantities throughout the public sector, and sustainability must be created from ideas provided by other relevant professional collaborations. Therefore, the InTracs model initially needs sup-

port to enable the students to have adequate equipment and materials to engage the community and successfully demonstrate the usefulness and relevance to the people's well-being of the technologies generated at universities.

Finally, the InTracs model provides an opportunity to provide the urgently needed skilled manpower to provide technical assistance to the communities while implementing the essential projects and programs and allows adequate learning of the community from the university and of the university from the community.

NOTE

- a Ceva Santé Animale (CEVA), Libourne, France
<<http://www.ceva.com>>.

ACKNOWLEDGMENTS

This work was carried out with financial support from Ceva Santé Animale/Industri Kapital/IK Aid and Relief Enterprise (IKARE), the UK Department for International Development, and High Heights Services (HHS), and the staff and brigade students of faculty of veterinary medicine, Makerere University who participated in the implementation of the SOS activities. However, the views expressed in this article are those of the authors and not necessarily the funders.

REFERENCES

- 1 Fèvre EM, Coleman PG, Odiit M, Magona JW, Welburn SC, Woolhouse MEJ. The origins of a new *Trypanosoma brucei rhodesiense* sleeping sickness outbreak in eastern Uganda. *Lancet*. 2001;358:625–8. doi:10.1016/S0140-6736(01)05778-6
- 2 Welburn SC, Picozzi K, Fèvre EM, Coleman PG, Odiit M, Carrington M, et al. Identification of human infective trypanosomes in animal reservoir of sleeping sickness in Uganda by means of serum-resistance-associated (SRA) gene. *Lancet*. 2001;358:2017–9. doi:10.1016/S0140-6736(01)07096-9
- 3 Waiswa C, Olaho-Mukani W, Katunguka-Rwakishaya E. Domestic animals as reservoirs for sleeping sickness in three endemic foci in south-eastern Uganda. *Ann Trop Med Parasit*. 2003;97:149–55. doi:10.1179/000349803235001688
- 4 Picozzi K, Fèvre EM, Odiit M, Carrington M, Eisler MC, Maudlin I, et al. Sleeping sickness in Uganda: a thin line between two fatal diseases. *Brit Med J*. 2005;331:1238–41. doi:10.1136/bmj.331.7527.1238
- 5 Clausen PH, Waiswa C, Katunguka-Rwakishaya E, Schares G, Steuber S, Mehlitz D. Polymerase chain reaction and DNA probe hybridisation to assess the efficacy of diminazene treatment in *Trypanosoma brucei*-infected cattle. *Parasitol Res*. 1999;85: 206–11.
- 6 Okiria R, Okuna NM, Magona JW, Mayende JSP. Sustainability of tsetse control by subsequent treatment of 10% of a previously treated Ugandan cattle population

with 1% w/v deltamethrin. Trop Anim Health Pro. 2002;34:105-14

7 Waiswa C, Picozzi K, Katunguka-Rwakishaya E, Olaho-Mukani W, Musoke RA, Welburn SC. *Glossina fuscipes fuscipes* in the trypanosomiasis endemic areas of south eastern Uganda: apparent density, trypanosome infection rates and host feeding preferences. Acta Trop. 2006;99(1):23-9. doi:10.1016/j.actatropica.2006.06.005

8 FVM strategic plan document, 2008-2017. Unpublished internal document.

9 Brownlow A. Personal communication.

10 Coordinating Office for Control of Tsetse and Trypanosomiasis In Uganda [COCTU]. Unpublished records on tsetse and trypanosomiasis. N.d.

11 Stamp Out Sleeping Sickness [SOS] [Internet]. N.d. [cited 2010 Jul 8]. Available from: <http://www.stampoutsleepingsickness.com/about-sos-.aspx>

12 Vian T, Richards SC, McCoy K, Connelly P, Feeley F. Public-private partnerships to build human capacity in

low income countries: findings from the Pfizer program. Hum Resour Health. 2007;2:5-8.

13 Hendrix CM, McClelland CL, Thompson I, Maccabe AT, Hendrix CR. An interprofessional role for veterinary medicine in human health promotion and disease prevention. J Interprof Care. 2005;19(1):3-10. doi:10.1080/13561820400021700

AUTHOR INFORMATION

Charles Waiswa, PhD, is Head, Department of Veterinary Medicine, Makerere University, PO Box 7062, Kampala, Uganda. E-mail: cwaiswa@vetmed.mak.ac.ug. He specializes in research management and research on zoonotic disease control and coordinates Stamp Out Sleeping sickness (SOS) in Uganda.

John D. Kabasa, PhD, is Dean, Faculty of Veterinary Medicine, Makerere University, PO Box 7062, Kampala, Uganda. He specializes in research management and curriculum development, among many other things.