ANNEX 5

MID-TERM EVALUATION REPORT

TRYRAC: Improving the management of trypanosomiasis in smallholder livestock production systems in tsetse-infested sub-Saharan Africa

Stanny Geerts, DVM, PhD

Based on the presentations at the Management Committee (PMC) meeting in Lomé (24-25 March 2014) and on the reports available at the website I have made a mid-term evaluation of the TRYRAC project. In this report I successively deal with 1. an evaluation of the 7 work packages; 2. a SWOT analysis of TRYRAC (p.8) and 3. an overall assessment of the project (p 9). A list of the partners with their abbreviations can be found in appendix 1 (p. 11).

1. EVALUATION OF THE 7 WORKPACKAGES

WORKPACKAGE 1: Project management and coordination (WP leader: ITM; Partners: all partners)

After an initial meeting immediately after the inception of the project (27 March 2012) the programme management committee (PMC) has met three times: twice in Antwerp (24-25 May 2012 and 13-15 May 2013) and once in Lomé (24-25 March 2014). The next PMC meeting in 2015 is planned in Addis Ababa. All meeting and mission reports are available at the TRYRAC website (www.trypanocide.eu). It was agreed among the partners to move from a biannual reporting to an annual reporting, which is acceptable when there is a good communication flow in between the PMC meetings. According to the participants the internal communication did much improve during the course of year 2.

At the end of 2013 the project coordinator Tanguy Marcotty left ITM and was replaced by Vincent Delespaux. The transition went very smoothly because V. Delespaux was already heavily involved in the project right from the beginning. Although there have been some

minor problems in the previous years due to misinterpretation of the financial rules, the partners are very satisfied with the financial management of the project.

During the PMC meeting in Lomé it was suggested that all the standard protocols (e.g. block treatment, sampling procedures, etc) should be available at the partner area of the website and that the external communication section should not be password protected.

WORK PACKAGE 2: Develop tools to detect trypanocidal drug resistance and establish local capacity and capability to diagnose drug resistance and to conduct trypanocidal drug quality control (WP leader: ITM; Partners: UFB, CIRDES, UP, NAHDIC, a regional quality control laboratory; Associates: FAO, University of Glasgow)

Development of molecular tools to detect drug resistance to isometamidium(ISM)

A PhD student (Eliane Tihon) has been recruited at ITM, Antwerp. Although highly sophisticated molecular tools (whole genomic sequencing) are used to develop a tool for the detection of resistance to ISM, it appears more complicated than expected due i.a. to the high mutation rate in *Trypanosoma congolense*. Recently, the PhD student has realised a successful in vitro cultivation of *T. congolense.* If this can be repeated in the coming months, it should facilitate the development of a tool. However, it appears unrealistic to expect a tool to be ready and validated by the end of year 3 as foreseen in the original planning.

Transfer of molecular tools and protocols to regional laboratories

Originally it was planned to transfer the molecular tools for the detection of trypanocide resistance to CIRDES (Burkina Faso), the University of Pretoria (UP, South Africa) and NADHIC (Ethiopia). It was agreed among the partners to add the laboratories of the 'Direction de l'Elevage du Togo' (VetTogo) and of the Eduardo Mondlane University (EMU) in Mozambique. Currently, the PCR for the detection of resistance to diminazene has been transferred to CIRDES, EMU and UP.

A part-time post-doc (Dr. H. Vitouley) has been recruited who will start the quality control testing of the above mentioned laboratories during year 3 by sending blind samples and evaluating their performance.

Identify and equip drug quality laboratories

Thanks to the financial support of GALVmed (Global Alliance for Livestock Veterinary Medicines) and FAO/IFAH (International Federation for Animal Health) the laboratory for the control of veterinary drugs at Dakar (LACOMEV) has received the necessary equipment to perform quality testing of the trypanocidal drugs diminazene and isometamidium. The first samples have been analysed recently (see under WP3). The cost per sample (originally estimated at 50 €, later at 200 €) was seriously underestimated since LACOMEV asks now 350 €, which implies that significantly less samples will be analysed than foreseen.

<u>WORK PACKAGE 3</u>: Determine prevalence of trypanocide resistance and quality of trypanocidal drugs on local markets in Ethiopia, Mozambique and Togo (WP leaders: VetTogo, EMU, NAHDIC, ITM; Partners: regional laboratories (UP, CIRDES, NAHDIC), FUB, VSF; Associates: University of Glasgow, FAO)

Selection of intervention areas

In Togo and Mozambique the intervention areas which were foreseen in the project document (annex 1) were maintained, i.e. Kora and Dapaong departments in northern Togo and Chinde, Nicoadala and Maganja da Costa Districts of Zambézia Province of Central Mozambique. Due to the fact that some tsetse and trypanosomosis interventions were already going on in the Arba Minch Zuria, Mirab Abaya and Amaro districts in southern Ethiopia, another intervention area was choosen: three districts (Abeshege, Enemor and Ener and Cheha) from the Gurage zone of the southern nation and nationalities people regional state. One district (Ameya) from south western shoa of the Oromia regional state was selected as control site for the study.

In each of the 3 countries a PhD student was selected and recruited: Guy Tchamdja (Togo), Fernando Chanisso (Mozambique) and Telahun Tekle (Ethiopia).

Cross-sectional survey (prevalence and drug use)

In Ethiopia and Togo about 2,500 cattle have been examined for trypanosomes in order to identify the hot spots (the villages with a trypanosome prevalence of > 10 %). Unfortunately, due to some car acquisition problems this survey could not be realized in Mozambique. However, some data from the years 2009-2010 are available for 1413 cattle from the study

area. Data on drug use and trypanosome stabilates (in liquid nitrogen) were collected in Togo and Ethiopia.

Determination of type and prevalence of trypanocidal drug resistance

Togo and Ethiopia

Hot spots were identified in Togo and Ethiopia. In order to save time and money a modified simpler protocol of block treatment was agreed upon (see Mungube et al., 2012. Parasite & Vectors 5: 155). Using this protocol it was confirmed that resistance to diminazene and ISM is present in trypanosome strains in Togo and Ethiopia. Further information on drug resistance will become available once the collected trypanosome stabilates will have been analyzed during year 3.

Mozambique

Based on the data of 2009-2010 and on some additional sampling during 2012 and 2013 5 hot spots were identified in Mozambique. Trypanosome stabilates were collected and some preliminary tests on drug resistance were carried out, which indicated that resistance to isametamidium might be present. Block treatments are planned in year 3. There is some doubt whether the trypanosomes in the study area are transmitted by tsetse flies (none have been identified up to now) or only by biting flies. It was agreed during the PMC meeting in Lomé that an entomological study needs to be done to clarify the situation. Money will be reallocated for this study which will be launched in year 3 by Dr. Bauer (follow-up during 12 months by the PhD student from Mozambique).

Determine quality of trypanocides on local market

Fifty samples of trypanocidal drugs were collected at official and unofficial selling points in Togo and another 50 in Ethiopia. In Mozambique the sampling is scheduled in year 3. Out of the 34 Togolese samples (33 diminazene and 1 isometamidium) which were analyzed at LACOMEV up to now it appears that 40 % of the samples were non-conform (i.e. > 10 % difference from the active ingredient mentioned on the label). The percentage of non-conformity in the official market was 28.6 % against 47.6 % in the unofficial market.

Genetic mapping

Originally it was foreseen to recruit a PhD student on project funds for the genetic mapping of *T. congolense.* However, FUB Berlin found another source (DAAD: German Academic Exchange Service) for sponsoring Yosra Ahmed Helmy (PhD student). She has been trained at the University of Glasgow (associate partner) and is currently working at FUB together with Antje Hoppenheit on genotyping of *T. congolense*.

WORK PACKAGE 4: Develop and test best-bet integrated strategies to improve effectiveness of trypanocides and minimize and control trypanocide resistance (WP leader: FUB; Partners: VetTogo, EMU, NAHDIC, ITM, VSF; Subcontract: tsetse control consultant)

FUB recruited a post-doc Antje Hoppenheit for this WP. Fact finding missions were performed in Ethiopia and Togo (reports available at the TRYRAC website). Based on 1. the results of these fact finding missions, 2. on the available data about the prevalence of trypanosomiasis and drug resistant strains, 3. the presence of tsetse flies a best-bet strategy has been determined for Togo and Ethiopia. It consists of a combination of rational trypanocidal drug use, restricted insecticide spraying of cattle, protection of the animals by insecticide treated netting and improved management (better feeding and regular anthelmintic treatment). Both intervention and control herds will be biologically monitored over a period of 2 years three-monthly starting in year 3.

For Mozambique a fact finding mission is planned for June 2014. If more data can be collected on trypanocide drug resistance and on the presence/absence of tsetse flies in the coming months, it should be possible to develop a best-bet strategy and appropriate delivery systems by the end of this year.

WORKPACKAGE 5: Develop and use delivery systems to support control strategies. (WP leader: VSF, Partners: EMU, NAHDIC, VetTogo, ITM, FUB, LUH)

Cyril Pisang was recruited as extension expert on project funds. He left the project, however, and was replaced by Haret Hambe.

Diagnosis of the institutional environment in which the extension message will have to be developed and transferred

A detailed analysis of the institutional environment in Togo, Ethiopia and Mozambique has been made. For the 3 countries all stakeholders with a possible role in the development and/or delivery of extension messages have been identified. The existing policy and legislation with regard to tsetse/ trypanosomiasis control and the importation, quality control, distribution and administration of veterinary drugs and insecticides was reviewed. A high tax on imported insecticides in Togo was identified as a serious problem. An extension strategy is already developed for Togo, but still needs to be elaborated for Ethiopia and Mozambique.

Message development and transfer

Since the best-bet strategies for Togo and Ethiopia became only available at the end of March 2014 the message development will start from April onwards. As there will be a whole range of different extension messages for various stakeholders, it was suggested during the PMC in Lomé to prioritise these messages and to identify the most important target group for each of them. The original planning which foresaw the development and transfer of the extension messages to be finished by the end of year 3 is not realistic. Hopefully the messages will become available during the second semester of 2014 and message transfer can start through certain media before the end of 2014.

Since no best-bet strategy is yet available for Mozambique, message development could not yet start.

<u>WORKPACKAGE 6:</u> Determine impact of intervention on the livelihoods of smallholders (WP leader: LUH; Partners: VetTogo, EMU, CIRDES, NAHDIC, VSF)

Baseline impact assessment survey

The baseline impact assessment surveys in Togo and Ethiopia were completed in February 2013. Five hundred small-scale farmers were selected in each country using a multi-stage sampling frame. Twenty-five households were randomly selected out of 20 villages comprising both intervention and control villages. The questionnaires were translated in the local language and the household heads responsible for livestock production and animal health management were interviewed (duration: 1 to 3 hours). All the data were cleaned and imported into Stata. From a preliminary analysis it appears that there is a clear-cut difference between the farmers' perception in Ethiopia and Togo. Ethiopian farmers consider trypanosomiasis as the most important livestock disease whereas in Togo other diseases are

considered equally important as trypanosomiasis. Similarly, trypanocide drug resistance is rated more important in Ethiopia than in Togo. Further analysis of the collected data will be carried out during 2014 by the Msc student Weyori Alirah Emmanuel under the supervision of the PhD student Sabine Liebenehm. It will focus on the impact of KAP (Knowledge, Attitude and Practices) on livestock disease management and the impact of livestock on household income.

For Mozambique there is not enough time left to carry out a detailed baseline survey as in the other 2 countries. In the study area there are quite a lot of commercial farms (50 up to 1000 cattle) besides small-scale farms (10 cattle on average). Depending on the numbers of each type of farms a simplified baseline impact assessment survey will be carried out for the small-scale farms and a case study for the commercial farms. It is planned to carry out these studies in September 2014.

<u>WORKPACKAGE 7:</u> Promote use of an integrated approach for trypanocidal drug use at continental scale (WP leader: ITM; Partners: all partners; Subcontract: update of trypanocidal drug resistance situation)

- A project website has been developed and was functional very soon after the launching of the project. It is regularly updated.
- Workshops with all stakeholders have been organised in each of the 3 African countries.
- During the PMC meeting in Lomé it was decided to postpone the review on trypanocidal drug resistance in Africa to the second semester of year 4 and the first semester of year 5. By doing so all the information collected during the project can be included. Furthermore, instead of subcontracting this work all partners will contribute to the writing of the review.
- 5 PhD students have been engaged by the project. It is expected that each of them will write 2 or 3 scientific articles so that the target of 11 articles should be reached easily. Currently, one draft paper is almost ready for submission to a scientific journal and a second one is in preparation.
- The project has been presented at 2 important scientific meetings during 2013: the ISCTRC (International Scientific Council on Trypanosomiasis Research and Control) in Khartoum and the AITVM (Association of Institutes of Tropical Veterinary Medicine) in Pretoria.

- The project coordinator is currently writing a strategy paper to further increase the visibility of the project.

2. SWOT ANALYSIS

At the end of the PMC meeting in Lomé the strengths, weaknesses, opportunities and threats (SWOT) were discussed together with all participants.

Strenghts

- Multidisciplinary north-south collaborative project using both highly sophisticated and simple tools
- Expertises of the north and south partners are complementary
- Perception of the stakeholders that tsetse and trypanosomiasis is a really important problem
- Translational research project with strong focus on GRIP (Getting Research Results Into Practice)
- Strong commitment of the political authorities in the 3 African countries of the project
- Strong motivation of the 5 PhD students
- Well equipped laboratories supporting the project activities

Weaknesses

- Insufficient and complex budget impairing some project activities
- Problem of internal communication between some partners due to language heterogeneity (French, English, Portuguese)
- The University of Pretoria as regional laboratory is underused by the project.
- Gender imbalance at various levels in the project

Opportunities

- Collaboration with Global Alliance for Livestock Veterinary Medicines (GALVmed) and FAO/IFAH allowing the purchase of expensive essential equipment for the drug quality analysis at LACOMEV
- Better understanding of farmer's behaviour not only in relation with tsetse/trypanosomiasis, but also in other domains
- Capacity building at institutional level, but also at personal level for all stakeholders involved in the project
- Gender imbalance obliges to look for creative ways to solve this problem

Threats

- Lack of regulations concerning the quality control of imported trypanocidal drugs
- Illegality of trypanocidal treatments by farmers
- Complexity of the local tax regulations
- High taxes on the import of insecticides in Togo
- Resistance of farmers to adopt best-bet strategies
- Political instability in Mozambique
- Lack of veterinary services in remote areas in the three countries
- Blurry legal status of Community Animal Health Workers (CAHWs)

3. OVERALL ASSESSMENT OF THE PROJECT

At the end of year 2 the project has reached its cruising speed. During the past 2 years most of the preparatory work has been done in Togo and Ethiopia in order to prepare the core business of the project, i.e. the implementation of specific strategies and extension messages to improve the management of trypanosomiasis in smallholder livestock production systems. Unfortunately, due to some administrative problems beyond the responsibility of the project partners this was not the case in Mozambique. Overall, there has been a good collaboration among the partners, even though the communication was not always easy due to language problems. The University of Pretoria is less involved in the project than the other partners. However, this is not a major problem because UP is not playing a major role in the project. The transfer of new molecular tools to the laboratory of UP should not be a problem.

At the end of year 2 significant progress has been made concerning the following 4 main activities of the project:

1. Develop, validate and transfer molecular tools, including novel genetic markers, to detect trypanocide resistance to three African laboratories;
2. Support establishment of a drug control laboratory in Africa and conduct drug quality surveys in three countries;
6. Determine impact of intervention (s) on livelihoods of livestock producers (baseline survey realized);
7. Attend conferences and meetings of appropriate fora, produce reports and publications to promote integrated approach at continental scale.

For the main activities no. 3 and 4, there is a slight delay, but it should be possible to catch up. During the PMC meeting in Lomé a more realistic timeframe has been agreed upon.

3. Identify and evaluate suspected "hot spots" of trypanocide resistance in south-western Ethiopia, Central Mozambique and northern Togo;
4. Develop and test best-bet integrated control strategies minimizing and reversing trypanocide resistance;

Year 3 will be a crucial year for the project because the real work in the field will have to start with the implementation of specific strategies and extension messages for an improved management of trypanosomiasis (main activity 5). This should be possible if the project intensifies its efforts to develop the extension messages for the best-bet strategies for Togo and Ethiopia and does all the necessary to catch up in Mozambique.

APPENDIX 1. PROJECT PARTNERS

Name of the Beneficiary:	Prince Leopold Institute of Tropical Medicine, Antwerp (ITM)
Nationality of the Beneficiary and date of establishment:	Belgian, 1931
Beneficiary's EuropeAid ID number	BE-2007-CRL-27111141317
Ongoing contract /Legal Entity File number (if available)	6000053075
Legal status	Institution of Public Utility
Partner 1:	Name: Free University of Berlin (FUB) EuropeAid ID number: DE-2009-BSZ-1610128640 Nationality and date of establishment: German, 1949 Legal status: University
Partner 2:	Name: Leibniz University Hannover (LUH) EuropeAid ID number: DE-2009-GED2210158025 Nationality and date of establishment: German, 1831 Legal status: University
Partner 3:	Name: Vétérinaires Sans Frontières – Belgium (VSF) EuropeAid ID number: BE-2007-AUT-2112656047 Nationality and date of establishment: Belgian, 1997 Legal status: Non-Governmental Organisation
Partner 4:	Name: Centre International de Recherche-Developpement sur l'Elevage en Zone Subhumide (CIRDES) EuropeAid ID number: BF-2009-CPP-2409913332 Nationality and date of establishment: Burkina Faso, 1994 Legal status: Inter-Governmental Research Institute

Partner 5:	Name: National Animal Health Diagnostic and Investigation Centre (NAHDIC) EuropeAid ID number: ET-2009-FVD-141010110096 Nationality and date of establishment: Ethiopian, 1978 Legal status: Governmental Institution
Partner 6:	Name: University of Pretoria (UP) EuropeAid ID number: ZA-2007-DSK-2711388710 Nationality and date of establishment: South African, 1908 Legal status: University
Partner 7:	Name: Direction de l'Elevage du Togo (VetTogo) EuropeAid ID number: TG-2009-FGU-1610126226 Nationality and date of establishment: Togolese, 1997 Legal status: Governmental Department (Personne morale de droit public).
Partner 8:	Name: Universidade Eduardo Mondlane (EMU) EuropeAid ID number: MZ-2009-DMY-1103471469 Nationality and date of establishment: Mozambican, 1962 Legal status: University