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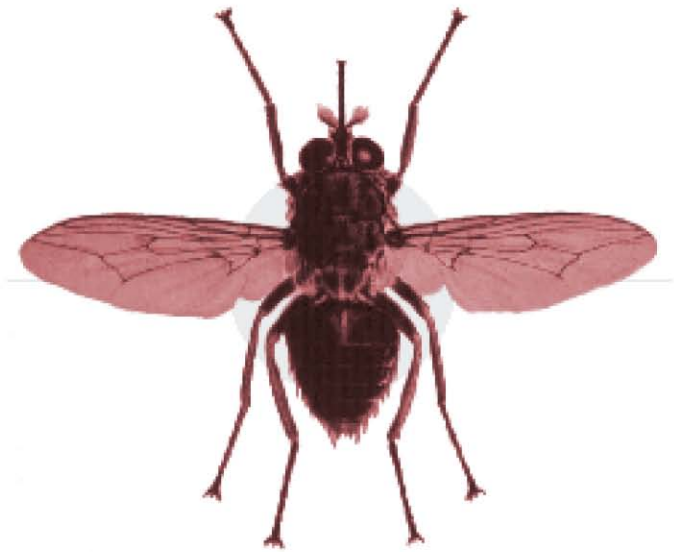

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TSETSE AND TRYPANOSOMIASIS INFORMATION

Numbers 14165–14340

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TSETSE AND TRYPANOSOMIASIS INFORMATION

The Tsetse and Trypanosomiasis Information periodical has been established to disseminate current information on all aspects of tsetse and trypanosomiasis research and control to institutions and individuals involved in the problems of African trypanosomiasis. This service forms an integral part of the Programme Against African Trypanosomiasis (PAAT) and is jointly sponsored by the Food and Agriculture Organization of the United Nations (FAO), the International Atomic Energy Agency (IAEA), the Inter-African Bureau for Animal Resources of the African Union (AU-IBAR), the World Health Organization (WHO), the Research Department for Livestock Production and Veterinary Medicine of the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD-EMVT), the British Government's Department for International Development (DFID) and the Institute of Tropical Medicine (ITM), Antwerp.

The half-yearly periodical is prepared for publication, in both English and French editions, by the Food and Agriculture Organization of the United Nations. Each annual volume consists of two parts and an index. Subscription is free for all recipients engaged in trypanosomiasis research and control, and requests for enrolment may be sent to: Ms Maria Grazia Solari, AGAH, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy (fax +39 06 5705 5749; e-mail MariaGrazia.Solari@fao.org).

Since the value of this information service depends to a great extent on the receipt of relevant material from research workers, campaign planners and organizers and field workers themselves, readers are requested to submit news items and copies of scientific papers and reports to the Editor: Dr James Dargie, Brunnstubengasse 43, 2102 Bisamberg, Austria (tel. +43 2262 61735; e-mail j.dargie@aon.at).

We regret that we are unable to supply photocopies of the papers quoted in the periodical.

Distribution dates and copy deadlines

	Copy deadline for news items	Distribution (English and French editions)
Part 1	15 April	July/August
Part 2	15 October	January/February

The Index will be distributed as soon as possible after the completion of each volume.

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ABBREVIATIONS USED IN *TTI*

AAT	animal African trypanosomiasis
a.i.	active ingredient
ACTH	adrenocorticotrophic hormone
ALAT	alanine aminotransaminase
ARI	advanced research institute
ASAT	aspartic acid aminotransaminase
b.w.	body weight
BIIT	blood incubation infectivity test
CATT	card agglutination test for trypanosomiasis
CD_{50}	median curative dose
CNS	central nervous system
CSF	cerebrospinal fluid
DNA	deoxyribonucleic acid
ELISA	enzyme linked immunosorbent assay
HAT	human African trypanosomiasis
HCT	haematocrit centrifugation technique
GIS	geographic information system(s)
GPS	global positioning system(s)
IPM	integrated pest management
i.m.	intramuscular(ly)
i.p.	intraperitoneal(ly)
i.v.	intravenous(ly)
IFAT	indirect fluorescent antibody test
KIVI	kit for in vitro isolation of trypanosomes
LC	land cover
LCCS	land cover classification system
LC_{50}	median lethal concentration
LD_{50}	median lethal dose
LPI	livestock policy initiative
M	molar
mAEC	miniature anion-exchange centrifugation technique
McAb	monoclonal antibody
MDGs	millennium development goals
MoU	memorandum of understanding
MW	molecular weight
NARS	National Agricultural Research Services/Systems
NGO	non-governmental organization
PAAT-IS	programme against animal trypanosomiasis-information system
PAG	PAAT advisory group coordinators
p.i.	post-infection
PCR	polymerase chain reaction
PCV	packed cell volume
ppb	parts per billion (10^9)
ppm	parts per million
r.h.	relative humidity
RNA	ribonucleic acid
SARD	sustainable agricultural and rural development
SAT	sequential aerosol technique
SIT	sterile insect technique
sp(p).	species (plural)
ssp(p).	subspecies (plural)
STEP	southern tsetse eradication project
TC	technical cooperation
T&T	tsetse and trypanosomiasis
TTI	tsetse and trypanosomiasis information bulletin
UV	ultra-violet
VAT	variable antigen type
VSG	variant surface glycoprotein
WBC	white blood cell

Organizations

AfDB	African Development Bank
ANDE	Agence Nationale de Développement de l'Elevage
AU	African Union
AU/STRC	African Union/Scientific, Technical and Research Commission
BICOT	Biological Control of Tsetse by the Sterile Insect Technique
CEBV	Communauté Economique du Bétail et de la Viande
CEMV	Centre Universitaire de Formation en Entomologie Médicale et Vétérinaire
CGIAR	Consultative Group on International Agricultural Research
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement
CIRAD-EMVT	Département d'Elevage et de Médecine Vétérinaire des Pays Tropicaux du CIRAD

CIRDES	Centre International de Recherche-Développement sur l'Elevage en Zone Subhumide
CNERV	Centre National d'Elevage et de Recherches Vétérinaires
CNRS	Centre National de Recherche Scientifique
COCTU	Coordinating office for contriol of trypanosomiasis in Uganda
CREAT	Centre de Recherche et d'Elevage, Avétonou, Togo
CRSSA	Centre de Recherches du Service de Santé des Armées Emile Pardé
CTVM	Centre for Tropical Veterinary Medicine
DFID	Department for International Development (UK)
DSE	German Foundation for International Development
EC/EU	European Community/European Union
EDF	European Development Fund
ESTA	Ethiopian Science and Technology Agency
FAO	Food and Agriculture Organization of the United Nations
FIND	Foundation for Innovative New Diagnostics
FITCA	Farming in Tsetse Control Areas of Eastern Africa
GFAR	Global Forumon Agricultural Research
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IAEA	International Atomic Energy Agency
IBAR	Interafrican Bureau for Animal Resources
ICIPE	International Centre of Insect Physiology and Ecology
ICPTV	Integrated Control of Pathogenic Trypanosomes and their Vectors
IFAD	International Fund for Agricultural Development
IFAH	International Federation for Animal Health
ILRI	International Livestock Research Institute
INRA	Institut National de Recherche Agronomique
IPR	Institut Pierre Richet
IRD	Institut de Recherche et de Développement (formerly ORSTOM)
ISCTRC	International Scientific Council for Trypanosomiasis Research and Control
ISRA	Institut Sénégalais de Recherches Agricoles
ITC	International Trypanotolerance Centre
ITM	Institute of Tropical Medicine
KARI	Kenya Agricultural Research Institute
KETRI	Kenya Trypanosomiasis Research Institute
LCV	Laboratoire Central Vétérinaire
LNERV	Laboratoire National de l'Elevage et de Recherches Vétérinaires
LRE	Laboratoire Régional de L'Elevage
LSHTM	London School of Hygiene and Tropical Medicine
MRC	Medical Research Council
MRU	Mano River Union
NITR	Nigerian Institute for Trypanosomiasis Research
NRI	Natural Resources Institute
OCCGE	Organisation de Coopération et de Coordination pour la Lutte contre les Grande Endémies
OCEAC	Organisation de Coordination pour la Lutte contre les Endémies en Afrique Centrale
OGAPROV	Office Gabonais pour l'Amélioration de la Production de la Viande
OIE	Office International des Epizooties
OMVG	Organisation pour la Mise en Valeur du Fleuve Gambie
PAAT	Programme against African Trypanosomiasis
PATTEC	Pan-African Tsetse and Trypanosomiasis Eradication Campaign
PRCT	Projet de Recherches Cliniques sur la Trypanosomiase

RDI	Rural Development International
RUCA	Rijksuniversitair Centrum Antwerpen
SADC	Southern African Development Community
SIDA	Swedish International Development Authority
SODEPRA	Société pour le Développement des Productions Animales
TDR	UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases
TDRC	Tropical Diseases Research Centre
TPRI	Tropical Pesticides Research Institute
TTRI	Tsetse and Trypanosomiasis Research Institute
UCLT	Unité Centrale de Lutte contre la Trypanosomiase
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNTFHS	United Nations Trust Fund for Human Security
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
UTCC	Uganda Trypoanosomiasis Control Council
UTRO	Uganda Trypanosomiasis Research Organisation
WHO	World Health Organization

CONTENTS

SECTION A – NEWS

AfDB/AU-PATTEC

Special Donors Meeting 1-2 September 2006, Addis Ababa, Ethiopia.

The African Union-Pan African Tsetse and Trypanosomiasis Eradication Campaign (AU-PATTEC) organized a special donors meeting on 1-2 September 2006 in Addis Ababa, Ethiopia. AU-PATTEC and AfDB (African Development Bank) estimate that the total funding required to free 37 sub-Saharan countries from the tsetse and trypanosomosis (T&T) problem within the next fifteen years would amount to about US$ 3,150 million, of which AfDB has made available for the six 'list-1' countries (Burkina Faso, Mali, Ghana, Ethiopia, Kenya and Uganda) loans amounting to US$ 80.2 million and has earmarked for the twelve 'list-2' countries some additional US$ 76 million.

At the meeting, the WHO highlighted their intensified efforts in providing relevant training and in stepping-up sleeping sickness surveillance, drug supply (with the support and donations from the private sector) and respective treatments, which resulted in a decline of new cases of human African trypanosomosis (HAT) by 57 percent. Colleagues from WHO also covered in their report relevant activities under its special programme for research and training in tropical diseases (TDR).

Project counterparts presented summary reports on the status of activities under the six 'list-1' projects, and also on the work done by some of the twelve 'list-2' countries, which are preparing for sub-regional AfDB supported T&T intervention campaigns under the AU-PATTEC initiative. Particularly impressive was the presentation on the joint work already done by Angola, Botswana, Namibia and Zambia. Following the 2001/2002 sequential aerosol technique (SAT) campaign in the Okavango Delta, Botswana's aerial spraying operations were expanded in mid 2006 to cover the remaining tsetse habitats in Botswana (some 5700 km²) and adjacent tsetse-infested areas in the Namibian Caprivi strip and in Southern Angola (4700 and 200 km², respectively). During the next three years the four countries envisage an expansion of the transboundary SAT operations into some 16 000 km² tsetse-infested areas of southern Angola and southwest Zambia, thus attempting to free in total some 40 000 km² of land with open vegetation from the tsetse-transmitted trypanosomosis problem. Other tsetse-infested areas in northern Angola, where sleeping sickness is wide-spread, are scheduled to be treated as of 2011. More north, the fly habitats are denser than in Botswana and complete eradication of tsetse flies may not be achievable as easily as this appears to have been possible as a result of the 2001/2002 SAT operations in the Okavango Delta.

The Vice-President of AfDB, Dr. Zeinab El Bakri, requested Heads of Delegations of T&T affected countries, as well as, donor countries and organizations represented at the Special Conference to make announcements on intended national and international contributions. Besides a) the envisaged US$ 76 million of AfDB loans to the 12 'list-2' countries; b) some countries' re-confirmation of national contributions to planned T&T interventions; and c) assured continued support from the mandated UN organizations, no major additional pledges were made at the meeting.

REPORT OF THE TWELFTH PAAT ADVISORY GROUP CO-ORDINATORS MEETING

Foreword

The twelfth PAAT Advisory Group (PAG) Coordinators' meeting was held in Kasane, Botswana from 18-19 October 2006.

Mr R.C. Mattioli, Focal Point of the PAAT Secretariat, gave a brief introductory note and highlighted PAAT mandate and activities.

Mr A.A. Ilemobade, PAAT Chairman, welcomed the participants and thanked the PAAT Secretariat for convening the meeting and the Botswana authorities for assisting the PAAT Secretariat in the meeting organization. The PAAT Chairman recalled the objectives of the Programme and of the meeting. PAAT's scope and interest are broad, embracing also the related dimensions of rural and animal health, land use, natural resources and socio-economic development. These public goods are all interconnected and brought together under one single PAAT umbrella. Doing so, PAAT creates the best opportunities to benefit from the inter-agency PAAT alliance and opens the door to a comprehensive landscape based approach, addressing arthropod borne diseases, farming systems, integrated pest management (IPM), environment, sleeping sickness and other human and animal health constraints to rural development. The action programmes drawn up under the auspices of PAAT are aimed at changing the disease stricken landscape into healthy rural development environments. PAAT supports this process directly through the analysis of landscape dynamics, applying satellite imagery, land cover maps, livestock distribution maps, spatial epidemiology and rural income distributions, all applied in order to prioritise where and how disease affected rural areas may best be turned into healthy agricultural production environments. With the landscape scale studies gaining in importance, PAAT paves the way for a more rational approach to rural development in tsetse affected regions starting with the protection of people and their livestock. At the end of his introductory note, Mr Ilemobade welcomed the Deputy Permanent Secretary, Ministry of Agriculture to open the meeting.

The meeting was officially opened by Mr M.C. Chimbombi, Deputy Permanent Secretary. He expressed the honour to host the meeting and thanked the Government of Botswana and national institutions for providing the resources for the meeting. Mr Chimbombi confirmed the commitment of his Government to eliminate the problem that tsetse and trypanosomiasis (T&T) pose to livestock, agriculture and tourism (sleeping sickness) industry development. He attributed the poor performance of the livestock-agriculture sector in Botswana to the presence of T&T. In fact, in the National Poverty Reduction Strategy, the elimination of trypanosomiasis is an area that needs attention. The Deputy Permanent Secretary mentioned the successful tsetse elimination operations undertaken in 2001-02 over 16 000 km^2 and an additional operation on 10 000 km^2 initiated in 2005 funded by Botswana with Namibia providing logistical support. At the end of his intervention, Mr Chimbombi declared the meeting officially open.

Brief and discussion on the last PAG meeting report – A.A. Ilemobade

The Agenda of the meeting was agreed to by members of PAG. Consequently, the conclusions and recommendations of the last meeting, held in Addis Ababa, Ethiopia, September 2006, were discussed and endorsed.

Report of the PAAT Secretariat and FAO/PAAT activities – R.C. Mattioli

The participants were informed on FAO and PAAT activities since the last PAG meeting. Normative and technical assistance has been provided to PAAT partner countries.

FAO/IAEA/WHO/PAAT developed and presented a document which outlines possible assistance of the UN PAAT mandated organizations to tsetse affected countries along a phased, conditional approach. A joint IAEA-FAO project (US$1.7million) to support T&T intervention in the Southern Rift Valley of Ethiopia has been approved by the Japanese Government through the UNTFHS.

In partnership with DFID, FAO published a paper entitled "Mapping the benefits: a new decision tool for T&T interventions" which links quantitative economic variables to a GIS spatial framework in order to provide new insights and reinforce decision making process for intervention. Technical advice has been provided to the STEP project in Ethiopia and to planning T&T intervention in the six countries (Burkina Faso, Ethiopia, Ghana, Kenya, Mali, Uganda) benefiting from the AfDB financial support for T&T intervention.

Technical visits were paid to the above mentioned six countries, international research institutes based in Africa and Europe, and NARES to discuss and assess, *inter alia*, available facilities, human resource development and training modules.

Distance learning training packages, in particular for e-conference moderators, have been disseminated. Also in relation to training activities, WHO trained on the spot, hands on, several staff from the Ministry of Health and Veterinary Services Department of various sleeping sickness affected countries on HAT control methods. WHO also organized an international training course on African trypanosomiasis in Tunisia, October 2005. Sixteen participants from HAT endemic countries and research laboratories attended the course. A regional training course on "Standardized baseline data collection for area-wide T&T management" was jointly organized by IAEA and FAO, March-April 06, Nairobi, in collaboration with Kenya authorities, and with substantial coordination assistance from ICIPE and support from ILRI and AU-PATTEC. Twenty-six participants from T&T affected countries attended the course.

With regard to publications, in addition to the regularly published bi-annual Tsetse and Trypanosomiasis Information (TTI) bulletin, FAO is working on the standardisation of land cover mapping for T&T intervention. This activity will provide the basis for a PAAT Technical and Scientific Series publication. A draft document on guidelines for declaring areas T&T free was distributed for comment and further development, with a view to eventually produce a PAAT position paper. Another publication in the pipeline relates to a

study which defines guidelines for sustainable human and animal African trypanosomiasis control and rural development strategies.

In relation to partnership with the private sector and following negotiations, UNIDO has agreed to participate in the FAO-IFAH initiative on Quality Control/Quality Assurance of trypanocides. FAO and UNIDO confirmed, at DG level, their support to develop joint activities on the matter within the framework of PAAT. A joint (FAO / IAEA / UNIDO / IFAD / IFAH) project proposal has been drafted and circulated among involved parties for comments.

The PAAT Chairman led a two-man panel to carry out a review of ISCTRC and its Secretariat. The report and formulated recommendations were adopted by the ISCTRC Executive Committee at its 31st meeting.

FAO/PAAT activities also included active participation in international policy, scientific and technical fora, including:

- Regional Harmonization Workshop, Nairobi, Kenya, October 2005.
- Regional meeting of National Coordinators of AfDB and IAEA-TC funded projects, Vienna, Austria, December 2005;
- Consultants meeting on the "Role of pathogens and symbionts in tsetse sterile technique", organized by FAO/IAEA, Vienna, Austria, March 2006;
- 31st ISCTRC Executive Committee meeting, Addis Ababa, Ethiopia, September 2006.

FAO/PAAT convened the 10th PAAT Programme Committee meeting, Florence, Italy, April 2006. The six AfDB beneficiary countries, PAAT mandated organizations, UNIDO, ARIs, donor representatives and other national, regional and international stakeholders attended the meeting. Country representatives outlined the implementation of the workplans of the AfDB supported projects.

At the end of this session, Mr Mattioli informed PAG of the end of the chairship tenure (three years) of Mr Ilemobade in November 2006. Members of PAG endorsed the renewal for another three years of Mr Ilemobade as Chairman of PAAT.

Report from IAEA – U. Feldmann

Mr Feldmann gave an overview of current IAEA activities. These included the normative activities and building partnerships related to the production of "Generic design, technical guidelines and optimal location of tsetse fly mass-rearing facilities". This was complemented with the draft of a spreadsheet enabling Member States to identify size of tsetse factories, specify equipment needed and provision of cost estimates. Standard Operating Procedures (SOPs) for advanced mass-rearing of tsetse flies were also produced. Within this framework, a meeting was convened in Vienna in July 2006 to advise on developing architectural blueprints for national and sub-regional tsetse mass-rearing facilities focusing mainly on Burkina Faso. Another consultants' meeting concerned the assessment of the minimal size of area-wide integrated pest management programmes, including SIT. The development of a mathematical model for planning and efficiency-assessment of different options of integrated

area-wide tsetse control strategies have been initiated. Two e-learning modules, one related to SIT-relevant irradiation dosimetry and a second one to tsetse strain compatibility testing have been developed.

Research and method development actions focused on improving and developing quality assurance of tsetse-mass rearing, such as advancement in facilitated/automated sexing of tsetse and research on salivary gland hypertrophic virus. A collaborative research programme has been initiated on "Improved and harmonized quality control for expanded tsetse production, sterilization and field application", and a new one to be initiated in 2007 will concern "Improving SIT for tsetse flies through research on their symbionts and pathogens".

The Agency's TC activities have provided support to the PATTEC Plan of Action through nine national technical cooperation projects (Botswana, Burkina Faso, Ethiopia, Kenya, Mali, Senegal, South Africa, Tanzania, Uganda) amounting approximately to US$3.4M in 2006 (foreseen 10 projects in 2007), and one regional technical cooperation project. Support was also given to a national workshop in Uganda (June 2006) to define a detailed action plan for the collection of entomological base line data in the Lake Victoria Basin. A feasibility study for creating a zone free of remaining two tsetse fly species in KwaZulu natal, South Africa was funded.

From October 2005 to October 2006, 66 person-months of scientific visits and fellowships relevant to T&T were supported by the Agency.

Other activities were mentioned previously in Mr Mattioli's presentation.

Report from WHO – P. Simarro

Recently, WHO has intensified its support to HAT affected countries in disease control activities and capacity building. As far as HAT control activities are concerned, 20 endemic countries have received assistance for screening (reagents for serological tests, equipment for diagnosis, financial support for mobile teams and free drugs for treatment) and surveillance network (monitoring and reporting).

Capacity building activities focused on training in diagnosis, case and programme management.

Mr Simarro provided an update of the epidemiological situation of sleeping sickness (SS). In eleven countries in which disease surveillance was not carried out, no cases of SS were reported, absence of cases of SS was also reported in four countries where surveillance action was implemented; ten countries reported less than 50 cases per year, between 50 and 1000 cases per year were reported in eight countries and only three countries reported more than 1000 cases/year.

A new partnership was established between WHO and FIND to improve diagnosis of HAT. This partnership is a result of a grant of US$ 10 million spread over five years from the Gates Foundation. Similarly, a consortium was created with a view to develop new drugs to

treat parasitic diseases. The consortium, of which WHO is a member, has received in September 06 US$ 23 million to develop new drugs for second stage disease status and for the development of a new drug, orally administered, for the first stage of the disease. The collaboration between WHO and Sanofi-Aventis for free drug supply, amounting to US $4 million and support to control activities (US 12$ million) continues. A platform for capacity building to develop clinical trials has been established.

Cooperation has also been activated with:

- CIRDES (Bobo Dioulasso, Burkina Faso) for SS surveillance and treatment in Dubreka and Island of Loos in Guinea;
- CTVM (Edinburgh, Scotland) to control SS in Uganda;
- PATTEC for increasing awareness on the PATTEC initiative and production and dissemination of information.

Mr Simarro concluded that WHO continued to provide support to PAAT and in particular to co-fund part of the PAAT Information System activities.

PAAT Information System: new features and future activities – G. Cecchi

An update of progress made in the development and management of the PAAT-IS was presented. The PAAT website has been revised, expanded and made available also in CD-ROM format. Renewed impetus has been given to the use of GIS techniques; datasets of national and regional predictions of tsetse distributions have been made available for downloading from the website and new standardized metadata have been generated and disseminated. The new website structure now includes a section on “Disease and vector control”, “Trypanotolerance”, “Area-wide integrated pest management”, “Integrated disease management” and “Guiding principles for decision making”. Sections on “Donors” and “Activities” related to ongoing T&T interventions have been added to the website. A link has been created with GeoNetwork (the FAO’s Spatial Data and Information Portal). This link allows sharing and disseminating trypanosomiasis-related GIS-datasets on an equal basis within a wider group of stakeholders, well beyond the present T&T community. It has to be mentioned that data and metadata in GeoNetwork comply with international standards (ISO 19115).

Within the framework of the PAAT-IS activities, technical visits have been made to the six AfDB beneficiary countries (Burkina Faso, Ghana and Mali in West Africa, Ethiopia, Kenya and Uganda in East Africa) with a view to assessing strengths and weaknesses in GIS and Information Systems (IS) management. The main common weak point in these six countries is (i) the absence of a centralized database for storage and analysis of entomological datasets and (ii) limited skills in GIS and IS management. Possible future support of PAAT-IS to AfDB funded national projects has been identified as follows:

- To update predictive maps of tsetse absence/presence and abundance;
- To produce standardized land cover maps, customised for different activities related to T&T intervention (e.g. collection of baseline entomological datasets; implementation of T&T intervention; environmental monitoring of the impact of T&T intervention);

- To provide assistance to AfDB supported project activities to develop environmental monitoring procedures (land use change; biodiversity) and guidelines for land use planning and natural resources management.

Standardising land cover mapping for T&T intervention – G. Cecchi

A draft paper was presented dealing with standardization of land cover (LC) classification for T&T intervention. Land cover datasets are essential in planning and monitoring T&T intervention activities. The available land cover maps are not necessarily produced for the needs of tsetse intervention and often apply heterogeneous classification systems. Hence, not all existing tsetse habitats can be described with the available classes and no clear boundaries exist between classes. The FAO/UNEP Land Cover Classification System (LCCS) overcomes this problems and it is expected to be adopted as the international standard by the International Organization for Standardization (ISO). Standardization of LC classification for T&T intervention will allow:
(i) inter-operability with LC datasets and maps produced by external sources;
(ii) easy development of customized manuals on land cover survey for field operators;
(iii) promotion and facilitation of regional and international cooperation.

The position paper (being proposed for publication in the PAAT Technical and Scientific Series) will deal with:

- Standardized land cover of tsetse habitats: analysis at continental level;
- Customization of a national, LCCS compliant dataset: the Africover map of Uganda for T&T intervention;
- Customization of multi-national, LCCS compliant datasets: the Africover map of East Africa for T&T intervention.

A standard description of LC classes of tsetse suitability has been developed and applied for tsetse distribution maps. Although improvement in mapping tsetse distribution has been achieved, the proposed values for tsetse suitability of the standardized LCCS classes should undergo a thorough examination by experienced entomologists and other T&T specialists and, where available, field datasets could be used to perform proper validation.

The IGAD Livestock Policy Initiative project: the T&T component – T. Robinson and A. Shaw

The IGAD-LPI, which comprises Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan, Uganda, implemented by FAO's Animal Production and Health Division (AGA), has included T&T as a component of its policy for livestock development. In IGAD's area, 80 percent of land is arid or semi-arid with high levels of poverty and food insecurity. A large proportion of the population depends on livestock for its livelihood and there is an increased demand for livestock and livestock products due to the demographic growth. Hence, there is an evolving requirement for both livestock services and the roles of actors involved. Policy and institutional framework need adjustment to accommodate trends in privatisation and decentralisation of livestock services, together with harmonisation of legislation and improved transboundary disease management.

The objective of the IGAD-LPI is to enhance the contribution of the livestock sector to sustainable food security and poverty reduction in the region. The purpose is to strengthen the IGAD capacity, member states, other regional organizations and other stakeholders to formulate and implement livestock sector and related policies that sustainably reduce food insecurity and poverty. The project is funded by the European Commission for a period of 4 years (2002-2005, budget US$7.5 million).

As far as T&T is concerned, the basic questions requiring attention are:

- Where to control;
- How to control: which control strategies (i.e. control vs. eradication) and which control methods (e.g. drugs, pour-ons, baits, SAT, SIT);
- Whether to integrate work on animal trypanosomiasis with HAT control activities.

Points to be considered in the formulation of T&T intervention strategy:

- 17 percent of IGAD cattle are at risk (16.5 million cattle);
- Countries with large numbers of cattle at risk are Ethiopia [4.8 million (15 percent of the national stock)], Kenya [4.5 million (40 percent)], Sudan [4.4 million (11 percent)] and Uganda [2.2 million (43 percent)];
- Agro-ecological, climatic conditions and livestock production systems.

Building on previous experience and work ("Mapping the benefits..." in West Africa) the plan is to produce cost maps and benefit maps for the IGAD Region to assist policy makers and advisors in PATTEC and IGAD members states to make informed decisions about the "where" and "how" to control trypanosomiasis. The "Mapping the benefits" work integrates three models with economic variables mapped for the first time. This template has been demonstrated useful in West Africa but it is also of general applicability. The IGAD "mapping the benefits" model will follow a step analysis which includes:

- The definition of the production systems and map their location;
- The development of herd models for each production system;
- Adding price, information about performance with/without trypanosomiasis;
- The calculation of losses/head of cattle applied to population/system.

Information will be collected on:

(i) location of production systems;
(ii) distribution of draught cattle;
(iii) distribution of dairy cattle;
(iv) livestock production parameters;
(v) prices of livestock outputs and inputs.

Each of these packages requires more detailed sub-sets of information for an accurate analysis of costs and benefits. For this purpose, a questionnaire will be soon distributed to national collaborators to acquire the necessary information. This study will be jointly carried out by FAO-IGAD LPI and FAO/PAAT.

Comparable costing of alternatives for dealing with tsetse: estimates for Uganda – A. Shaw, S. Torr, C. Waiswa, and T. Robinson

The last two decades have seen a significant decline in both the veterinary and tsetse control services throughout sub-Saharan Africa. Sleeping sickness has re-emerged as an important health problem, with both *gambiense* and *rhodesiense* forms reaching epidemic levels. Dealing with animal trypansomiasis has been left almost entirely to farmers, who mostly rely on trypanocides, spending some US$30-40 million a year. Against this background, since 2000, there has been a movement to implement large scale "area-wide" programmes to control the vector, under the aegis of PATTEC. PATTEC has been extremely successful in mobilising support for dealing with T&T, especially among African leaders, and in mobilising funds; currently AfDB is lending some US$ 67 million to six countries for the creation of 180,000 km^2 of tsetse-free zones. It is important to those in the field of T&T that the planning and execution of this programme runs as smoothly as possible. Decision-making on choice of technique for suppression and elimination as well as on other issues (monitoring, accompanying measures, etc.) needs to be as informed as possible. This work deals with one of the key issues, the economic aspects of choice of technique within the context of PATTEC's initiative.

In Uganda, Zone 1 consists of four blocks of 10,000 km^2 each. On the many possible approaches to deal with the vector the following were considered:

- Use of bait technology with insecticide, in this case with traps;
- Use of bait technology using insecticide-treated cattle (ITC);
- Aerial spraying using fixed wing aircraft and the sequential aerosol technique (SAT) spraying five cycles;
- Use of the SIT following suppression of the fly population by one of the above means.

A tsetse population dynamics model was used to calculate the impact of the four techniques on fly population reduction rate. In order to provide a level playing field for testing and comparing all techniques a 10,000 km^2 (100 x 100 km) block was used as the basis for calculation. The timing of each technique was carefully worked out and then figures were discounted at 10 percent per annum to their present value in the year tsetse elimination started. Field costs, administrative overheads and necessary studies (tsetse surveys, sleeping sickness surveys, surveys of trypanosomiasis in cattle, environmental and tsetse monitoring) were all included (based largely on PATTEC proposal). Accompanying measures to deal with sleeping sickness and animal trypanosomiasis are crucial but being common to all strategies were therefore not costed. For simplicity, all costs are given per km^2 of tsetse infestation.

The results for tsetse isolated populations pointed out that ITC is the less expensive (from US$ 134 to US$ 392), followed by traps (range US$ 373-496), SAT (US$ 502-593) and SIT (SIT+25 percent ITC US$ 1,015, SIT+80 percent SAT US$ 1305. SIT cannot be used in isolation, i.e. without previous tsetse suppression campaign). A model for non-isolated tsetse population was also developed. For both isolated and non-isolated populations the basic cost-hierarchy of ITC, traps (for savannah flies), SAT and SIT is maintained. Both SAT and SIT results are very sensitive to the cost of flying time, e.g. field cost for SIT falls

from US$ 761 to US$ 694 if cost of flying time down from US$ 700 to US$ 500. In the case of non-isolated tsetse populations, the barrier cost estimation is relatively modest (invasion from one side and only for three years). Barriers through the use of ITC are much cheaper but need testing.

Some conclusions can be drawn from this work:

- Cost hierarchy is confirmed and this ranking is robust;
- Cost differentials are far greater at field cost level – as published studies have long emphasised;
- The high cost of SIT reflects its being additional to the cost of suppression;
- Combinations of techniques may, however, be the most cost effective approach in some circumstances, especially against *G.fuscipes*, so more combined strategies need costing and investigations.

The modelling approach has produced realistic *ex-ante* cost calculations to guide decision-makers, but raises questions which need to be confirmed by field work. Studies are needed to collect more field evidence of scale on which cheaper techniques can be deployed, trials of what works best with specific flies. High cost of accompanying measures (administration, monitoring, socio-economic and environmental studies) needs to be questioned. There may be lessons to be learnt from past projects (strengths and weaknesses).

The AfDB funded T&T intervention in Uganda: update on the technical implementation and anticipated PAAT support – L. Semakula

The AfDB funded (loan) project ("Creation of sustainable T&T free areas in East and West Africa: the Uganda component") is foreseen to be executed in three phases, each phase corresponding to a zone to be freed from T&T. The project is implemented by the Ministry of Agriculture, Animal Industry and Fisheries and coordinated by COCTU with the support of the PCMU (Project Coordination and Management Unit). The PCMU is composed of a Project Coordinator, a Project Entomologist, a GIS Specialist, a Monitoring and Evaluation Officer and an Accountant. The project was officially signed by the Government in May 2005 and the loan was received in January 2006, with the first disbursement obtained in April 2006 (last disbursement foreseen in December 2011). A National Steering Committee and a Procurement Contracts Committee were created in April 2006. Additional administrative and financial arrangements necessary for starting the project implementation and executing field activities have been partially completed in September 2006.

The project coordination and management are assured by the PCMU which is supervised by the National Steering Committee and the Uganda Trypanosomiasis Control Council (UTCC). PCMU has requested the Auditor General to appoint an Audit firm to audit the project. Technical training was provided to the GIS specialist; PCMU and AfDB convened a resident planning session (10-13 October 2006) to develop a comprehensive training needs action plan and community awareness creation for the period 2006-2010. A MoU has been signed with the private sector (CEVA, Industrial Capital), CTVM, University of Edinburgh and Makere University to stamp out sleeping sickness using mass treatment of cattle with trypanocides and epicutaneous application of insecticides. For this a grant of US$ 500,000 has been provided of which US$ 300,000 is for drugs and insecticides and US$

200,000 for field operations. The Uganda T&T intervention plan foresees, *inter alia*, the use of SIT to eliminate the flies from the project area and relies on the Kaliti (Ethiopia) tsetse mass-rearing facility for tsetse supply. This is still a critical issue since the rate of production of the tsetse colony of the Ethiopian fly factory does not allow it to produce and deliver needed/requested quantities of tsetse sterile males in the short/medium term. Hence, PAAT support is requested to technically explore the feasibility of using SAT as suppression/elimination technique of tsetse flies.

The AfDB funded T&T intervention in Ethiopia: update on the technical implementation and anticipated PAAT support – T. Alemu

The loan provided by AfDB (US$ 14.6 million for a period of six years) to the Ethiopian Government is supporting in the on going STEP which aims at eliminating the T&T threat from an area of 25,000 km^2 in the Southern Rift Valley of Ethiopia using an area-wide, integrated pest management approach. The project, implemented by the ESTA, has as ultimate objective to enhance the national agricultural and poverty reduction efforts and reduce the pressure on the highland resources by improving the conditions necessary for sustainable agricultural and rural development.

The removal of tsetse from the area follows a phased approach with the full participation of the communities. The management of the project is assured by ESTA, a STEP Steering Committee, a STEP Technical and Advisory Committee and a Project Coordination and Management Unit (PCMU). PAAT and PAAT mandated organizations (e.g. FAO, IAEA) are among STEP's partners. Current project staff comprises 41 technicians and 54 auxiliaries. A community based tsetse suppression activity is on going using insecticide treated cattle and impregnated targets; monitoring of vector density and disease occurrence is carried out. The implementation of the AfDB funded project has not started yet. In addition to the AfDB loan, a joint FAO-IAEA project, funded by the Government of Japan (US$ 1.7 million), through the UNTFHS, and jointly executed by STEP, FAO and IAEA has been approved and is about to start. This project focuses on providing support of on going STEP activities for AW-IPM (vector and disease removal), information management, environmental monitoring, land use planning, socio-economics and training activities.

The Ethiopian Government has established a tsetse rearing and irradiation centre in Kaliti (approximately 40 km from Addis Ababa). The colony of *Glossina pallidipes* has been successfully established and mass rearing is in progress. The present colony size is estimated in 66,000 females with a growth in pupae production of 17,000/week. Adult fly mortality is below 1 percent. An embryonic colony of *G. fuscipes fuscipes* has been established through shipment of flies from Bratislava. The full foreseen capacity production of the tsetse fly factory in Kaliti is estimated at 1 million sterile males/week.

Major difficulties in project implementation concern insufficient staff to supervise and provide quality assurance of field activities, lack of training of communities involved in tsetse suppression activities and lack of direct income from continued tsetse control, particularly outside communal areas.

Issues that require particular attention can be summarized as follows:

- To ensure long term technical assistance to enhance tsetse rearing and sterile male management;
- To make available skilled experts to guide and monitor AW-IPM including SAT application and sterile male release;
- To provide adequate training to local staff to meet project needs;
- To establish workable management structure and systems;
- To identify proper institutions that could collaborate on land use management and environmental aspects of the project;
- To urgently solve the issue of purchasing/providing an industrial irradiator for Kaliti Tsetse Rearing and Irradiation Centre.

The AfDB funded T&T intervention in Mali: update on the technical implementation and anticipated PAAT support – A. Djiteye

Three species of tsetse fly (*Glossina morsitans submorsitans*, *G. palpalis gambiensis*, and *G. tachinoides*), infesting about 240,000 km^2 (20 percent of the total land), are present in the country. According to Mr Djiteye, in Mali approximately 20 percent of the total population (12 million) is exposed to sleeping sickness and about 2.7 million cattle are at risk of trypanosomiasis. Every year more than one million trypanocide treatments are administered to cattle. This amount represents over 50 percent of the total sale of veterinary drugs.

Tsetse control campaigns, with the support of IAEA, were conducted from 2003 to 2005: fly population was reduced over an area of 4,500 km^2 of the Niger river basin. However, following a disruption of the tsetse reduction campaign, the last control revealed an increase of the fly population in the peri-urban area of Bamako. In order to eliminate once for all the tsetse problem, the Government foresees the use of SIT from an initial target area of 32,000 km^2 (i.e.15,500 km^2 in the Niger basin and peri-urban area of Bamako, and further 16,500 km^2 in the Bani basin from the northern limit to the border with Burkina Faso). This project will be executed with the financial contribution (loan and grant) of AfDB and the Malian Government. Project components are:

(i) suppression and eradication;
(ii) capacity building;
(iii) sustainable land management;
(iv) co-ordination and management.

These components will be complemented with thematic maps generated with the use of GIS. Data to be collected regard tsetse fly distribution and population dynamics, animal and human trypanosomiasis prevalence, socio-economics, environment (for environmental impact studies). In the tsetse suppression campaign, the participation of the rural communities is envisaged.

The use of SIT, for tsetse elimination, targets mainly *G. p. gambiensis* along the river basins; under study is the possibility to establish a tsetse colony in the country. The total budget of the fly elimination operation is estimated at US$11.5 million (AfDB loan: US$ 9.5 million; AfDB grant: US$ 0.4 million; Malian Government contribution: US$1.6 million). The support requested to PAAT concerns equipment and chemicals, studies on land use and

socio-economic analysis, providing expert services for GIS and capacity building (training courses).

The Botswana experience with tsetse intervention (e.g. SAT) and related environmental issues – Nlingisisi Babayani, Casper Bonyongo, Sikhumbuzo Modo, Kefentze Motshegwa, Portia Otlaadisa, and Dominic Mazvimavi

The tsetse fly aerial spray operation against *G. morsitans centralis* in the Kwando and Linkati areas was reported. Aerial spray in Botswana started in the 1970s to replace ground spray with persistent pesticides. Following SAT tsetse distribution shrunk from 25,000 km^2 to 5,000 km^2. Last cases of HAT were recorded in 1981 and nagana (animal trypanosomiasis) limited to sporadic outbreaks. In 1991 SAT was discontinued due to environmental concerns and replaced by insecticide impregnated targets which, however, failed to suppress tsetse population. In 1998 tsetse density in the northern Okavango delta reached pre-spray levels with a resurgence of bovine trypanosomiasis in 1999 (300 cattle died). The Government of Botswana approved an integrated T&T control programme which involved the re-introduction of SAT followed by SIT as a contingency measure.

In July 2000 all cattle at risk of trypanosomiasis were treated with trypanocides every four months (more than 30,000 cattle treated). The treatment campaign ended in April 2002. Aerial spray started in June 2001 and was concluded in August 2002 with tsetse elimination as objective. In the work plan the use of SIT was foreseen to complete fly elimination. However, SIT was not required since SAT achieved the objective to eliminate tsetse. The SAT operation in 01 treated 7,180 km^2 in the northern Okavango and included high tsetse density areas like Mombo and Guai. In 2002 a further 8,600 km^2 were sprayed in the southern delta and included the district of Maun. At the end of the SAT cycles (6 cycles in 2001 and 5 cycles in 2002), no tsetse flies have been caught or reported by workers or visitors in the delta since the end of the second SAT cycle. Regular monitoring surveys confirmed the elimination of the flies (i.e. no flies caught) up to June 2006. Also, regular veterinary surveys confirmed the absence of cases of animal trypanosomiasis in cattle and horses around the Okavango delta. The Okavango 2001/2002 SAT operation seems to be a success story and hopefully play a role in the advocacy for the use of the technique elsewhere in sub-Saharan Africa. The cost of aerial spraying and insecticide alone (i.e. exclusive of recurrent expenditures) was US$ 270/km^2. Main factors which have contributed to a successful SAT campaign can be attributed to the following:

- The terrain is flat/undulating, perfect for SAT application;
- The distribution limits of fly population were geographically well circumscribed;
- Strong political support to eliminate T&T from the area;
- Well elaborated work plan;
- Flexible public procurement process;
- Little external influences, i.e. the project was wholly funded by the Government of Botswana.

Following the elimination of tsetse and trypanosomiasis from the Okavango delta it was logical to apply the same approach in northern Botswana to eliminate tsetse completely from the country. This could only be achieved successfully if tsetse along the border with

Namibia, in the Caprivi area, could also be removed. The 06 operation, therefore, became the first regional collaborative operation in the AU's PATTEC initiative.

Environmental monitoring studies carried out by the Harry Oppenheimer Okavango Research Centre, in association with BioTrack (Macquarie University, Australia) failed to detect any long term or irreversible impact due to SAT on non-target species.

Main points during the round table general discussion – Moderator P. Holmes

Country representatives expressed the desire to establish a harmonized mechanism for requesting technical assistance to PAAT and PAAT-mandated organizations for the planning and implementation of AfDB funded projects and for identification of other priority areas for T&T intervention.

There was a request to explore the feasibility of the application of SAT in other areas, particularly in the Southern Rift valley of Ethiopia. In addition, it was suggested to that PAAT should be asked to produce guidelines on the use of SAT and to publish them under the format of a PAAT Technical and Scientific Series publication.

Meeting participants were concerned over the lack of established, regular training programmes addressed to field operators for implementation and execution of field actions.

Recommendations

1. ***On the complexity of multiple funded and multi-institutional implemented projects:***
   - International institutions/organizations should assist in the formulation of practical guidelines for the implementation of field T&T intervention projects.

   Action: PAAT and PAAT mandated organizations.

2. ***On technical and field operational aspects of T&T intervention, UN – PAAT mandated organizations should provide technical assistance in:***
   - defining a set of baseline data to be collected;
   - tsetse rearing methodologies;
   - the application of area-wide integrated pest management;
   - land use;
   - livestock development programme(s);
   - human and animal trypanosomiasis control measures;
   - identifying institution(s) to collaborate on land use planning and environmental aspects of T&T projects.

   Action: PAAT and PAAT mandated organizations.

3. ***On FAO Liaison Officers' network***:
   - urgent measures to be taken to revitalize the FAO Liaison Officers' platform;
   - review of the Terms of Reference (TORs) of the Liaison Officers to be undertaken;

- The network explores effective harmonization with national PATTEC Co-ordinators.

Action: FAO Regional Office for Africa, Accra, Ghana; National PATTEC Co-ordinators.

4. On training:

- To evaluate currently available training capacities and identify training gaps and needs;
- To harmonize/co-ordinate ongoing training activities in different projects and link them to the PATTEC initiative.

Action: PATTEC, National AfDB-PATTEC Project Co-ordinators.

5. On Land Cover mapping:

- To continue in the refinement process of Land Cover mapping (higher resolution maps) and in the standardization process for decision support in T&T intervention.

Action: FAO.

6. On developing tsetse intervention costing models, PAG agrees on the urgent need:

- To develop guidelines on suitability and cost of various tsetse intervention techniques in different entomological/ecological situations for fly suppression and elimination.

Action: IAEA, FAO in collaboration with PAAT partners and stakeholders.

7. On re-orientation of PAAT's role, PAG agrees on the need:

- To consider enlarging PAAT role to embrace issues in tsetse infested areas related to rural development, poverty alleviation, and human health to further enhance PAAT contribution to the attainment of the MDGs.

Action: PAAT Secretariat.

8.On the use of Sequential Aerosol Technique (SAT) to suppress/eliminate tsetse fly:

- A position paper to be produced on SAT including its feasibility and limitations in different ecological situations and its potential environmental impacts.

Action: PAAT Secretariat.

9. On the possible risk of the merger of Trypanosoma brucei rhodesiense and T. b. gambiense zones in Uganda, PAG urges that:

- An advocacy be undertaken on assistance from the international community.

Action: Uganda Government and national concerned institutions/authorities.

10. On criteria for declaring an area free of tsetse and animal trypanosomiasis following intervention:

- The developed criteria be simplified and published in a form of a position paper.

Action: IAEA, FAO and PAAT.

Acknowledgement

The PAAT Advisory Group Coordinators expressed their thanks and appreciation to the Government and people of Botswana for the warm hospitality extended to the participants and for the excellent facilities placed at the disposal of the meeting.

FAO ADDRESS TO THE 29TH ISCTRC CONFERENCE

At this Conference, which was held from 1-5 October 2007 in Luanda, Angola, Mr. Raffaele Mattioli of FAO's Animal Health Service noted that since the last ISCTRC Conference, there has been intense planning and discussion, at all levels, concerning the elimination of the problem of tsetse and trypanosomiasis (T&T) from sub-Saharan Africa for the benefit of the rural poor and the whole process of sustainability of rural development. At the same time, global, and certainly African-oriented investments in agriculture and rural development, had fallen dramatically in the last 20 years, and that although poverty reduction and food security are the overarching priorities for FAO and UN sister agencies, there was a tendency to downplay or even ignore the role of agriculture in overcoming poverty. Also, there is insufficient recognition and international political commitment to the central role of livestock as the engine for agricultural development, income generation and economic growth in sub-Saharan Africa. This matter deserves great attention and it is central to the whole issue of making progress with the identification, prioritization and eventual elimination of key development problems in this vast part of the African continent. - In other words, key development constraints needed to be removed. He reminded participants that, FAO, a long time ago, identified the T&T problem as a major obstacle to be overcome for achieving Sustainable Agriculture and Rural Development (SARD), and that this view is shared by the Comprehensive Africa Agriculture Development Programme (CAADP) of the New Partnership for Africa's Development (NEPAD) initiative. However, the interaction between livestock and the multi-dimensional problem of poverty can not be seen independently from other external factors like food production, fuel, water, human health and markets. Hence, it is essential that efforts to reduce the problem of T&T are duly placed in the context of SARD, which is defined as a process that:

- Ensures that the basic nutritional requirements of present and future generations are met while providing a number of other agricultural-livestock products.

The problem posed by T&T and the promotion of SARD is vast and complex. The disease is present over approximately nine million km^2. Its impact, in monetary terms, on African agriculture Gross Domestic Product is valued at $US 4.5 billion per year. The overall impact extends to the restricted access to fertile and cultivable areas, imbalances in land use

and exploitation of natural resources and compromised growth and diversification of crop-livestock production systems. Given the magnitude of the problem and considering its complex and dynamic medical, veterinary, agricultural and rural development dimensions, the policy and the strategy to be implemented need to be comprehensive and, over and beyond the entomological and parasitological aspects of the disease, need to be oriented:

- to food security and poverty alleviation;
- to the conservation and protection of the environment;
- to policy assistance;
- to capacity building and institutional strengthening for enhanced decision making capacity.

In recognition of this complexity, the FAO General Conference in 1997 approved the Programme Against African Trypanosomiasis (PAAT), a forum which the AU/IBAR, FAO, IAEA and WHO use to concert and harmonize international efforts against T&T. The major objective of PAAT is to enable more effective T&T management and intervention programmes for improved livestock production and increased opportunities for SARD. Since its inception, other UN agencies, like UNIDO and IFAD, have adhered to the PAAT international forum and its activities. Recently, FAO/PAAT has developed partnerships with the African Livestock (ALive) initiative, the FAO/OIE Global Framework for Transboundary Animal Diseases for Africa and the Private Sector, such as the International Federation for Animal Health (IFAH) for the very important issue of Quality Control/Quality Assurance of trypanocides on the African markets.

The launch of the Pan-African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC), established by the African Heads of State and Government in October 2001, underlined the recognition at the highest political level of the T&T problem as key constraint to African development, and the 31st session of the FAO Conference in November 2001 passed a resolution in support of PATTEC. In this regard, it should be recalled that both PAAT and PATTEC shared the long-term common goal of the elimination of the problem posed by the disease to the African continent.

PAAT and PATTEC are jointly working towards more general recognition of the T&T constraint as a key issue to be addressed at national, regional and international level for enhancing agricultural productivity and poverty alleviation in affected areas. One concrete example of the PAAT-PATTEC cooperation is the establishment of criteria and guiding principles for prioritising areas for T&T interventions in the context of SARD. These criteria and guidelines have been used and are going to be used by our colleagues responsible for the implementation of the projects supported by the African Development Bank in Burkina Faso, Ethiopia, Ghana, Kenya, Mali and Uganda. Also, PAAT is currently working with the FAO's Pro-Poor Livestock Policy Initiative (PPLPI), and with the Intergovernmental Authority on Development - Livestock Policy Initiative (IGAD's LPI) to further explore the costs and benefits of different control techniques. Having conducted a comparative analysis of the costs of various techniques in Uganda (with PPLPI), we are now building on work done in West Africa to map out the potential benefits of tsetse control in the IGAD Region of East Africa. This will help IGAD Member States and PATTEC to make informed decision on where and how to control T&T. Additional FAO/PAAT-IGAD LPI collaborative work includes the compilation and analysis of livelihoods zones in the Horn of Africa. We strongly believe that

the application of these criteria and guidelines are robust instruments which increase the feasibility and the efficacy of the interventions.

In addition, FAO/PAAT efforts and activity are directed to the harmonization of strategies and to the production of tools for T&T field programmes for policy makers and advisors, planners, scientific and technical staff. I would like to mention just a few of the most recent FAO/PAAT products and activity, such as:

- The standardization of land cover mapping for T&T intervention;
- The selection of global datasets for the management of trypanosomiasis problem: an environmental approach;
- The production of guidelines aiming at linking sustainable human and animal African trypanosomiasis control with rural development strategies;
- The study and publication of the book on mapping the benefits: developing a new decision tool for tsetse and trypanosomiasis intervention

An Interactive Training Workshop on "Harmonization of GIS-based decision support systems and information systems in T&T intervention" was organized late 2006 in FAO Rome. Among the field activities, mention should be made of the joint Ethiopian Government/IAEA/FAO project aiming at creating a zone free of tsetse and trypanosomiasis. This project is funded by the Japanese Government, through the UN Trust Fund for Human Security and it is executed in the southern part of the Rift valley in Ethiopia.

This was very short presentation of the problem posed by T&T to the development of agriculture and livestock in sub-Saharan Africa and of the role that FAO and PAAT play in support to FAO Member Nations and PATTEC in addressing the problem. However, in concluding, Mr. Mattioli stated that he was convinced that with the support and in collaboration with African colleagues, PATTEC and members of the international community, FAO, the PAAT alliance and others will successfully tackle the disease in sub-Saharan Africa, and thereby, contribute to SARD.

THE FAO/IAEA PROGRAMME

The FAO/IAEA Programme continued its active support of research, technology transfer and provision of science-based information to Member States of FAO and the IAEA relevant to the planning and implementation of area-wide integrated pest management activites involving the sterile insect technique (SIT). One major recent output from the programme was the publication of a textbook entitled "Area-Wide Control of Insect Pests: From Research to Field Implementation" and details of this are given in the Section on Book Publications. Full details on all activities, publications etc. can be obtained in the Insect Pest Control Newsletter which is published twice yearly (see http://www-naweb.iaea.org/nafa/index.html or http://www.fao.org/waicent/FAOINFO/AGRICULT/default.htm). Some recent highlights include:

Inauguration of the Tsetse Rearing and Irradiation Centre at Kaliti, Addis Ababa, Ethiopia (Technical Cooperation Project ETH5012).

The first two modules of the tsetse rearing and irradiation centre, located at Kaliti, Addis Ababa, Ethiopia of the Ethiopian southern tsetse eradication project (STEP) (supported under technical cooperation project ETH5012) was officially inaugurated on 3 February 2007. The inauguration benefited from being organized subsequently to the AU-PATTEC (African Union-Pan African Tsetse and Trypanosomiasis Eradication Campaign) Special Donors' Conference. Delegates from tsetse and trypanosomosis- (T&T) affected Member States, as well as, donor representatives were impressed by the facility. The event was well organized and numerous heads of delegations, including several ministers and ambassadors, participated in the meeting. As part of the opening ceremony, which was chaired by the Ethiopian Deputy Prime Minister, H.E. Addisu Legesse, Mr. Liang Qu, Director of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture made a brief statement on behalf of the Food and Agriculture Organization of the United Nations (FAO). All invited guests joined a tour through one of the fly production modules.

Third Research Coordination Meeting of the CRP on Improved and Harmonized Quality Control for Expanded Tsetse Production, Sterilization and Field Application 7-11 May 2007, Muguga, Kikuyu, Kenya.

The third research coordination meeting (RCM) of the CRP on Improved and Harmonized Quality Control for Expanded Tsetse Production, Sterilization and Field Application was held at the Trypanosomiasis Research Centre, Kenya Agricultural Research Organization (KARI-TRC), Muguga, Kikuyu, Kenya from 7-11 May 2007.

The meeting was attended by thirteen participants from twelve countries, three external observers and a number of observers from the host institute. The meeting was opened by the FAO Country Representative, Dr Castro Camarada, who recognized the burden caused by trypanosomosis and the role that the sterile insect technique could play in the eradication of tsetse flies for the control of African Human and Animal Trypanosomosis. The following presentations were divided into three groups on tsetse rearing, including blood collection and processing; tsetse development and behaviour; and methods to control the risk of released sterile flies picking up trypanosomes and transmitting the disease.

In the first group, improvements to the standard quality control parameters for rearing were presented and the problems of applying the standards under African rearing conditions were discussed. In particular the collection of sufficiently clean blood for tsetse diet is difficult in many locations. In the second group a detailed analysis of the genitalic structures in *Glossina pallidipes* and their relationship to mating behaviour and successful insemination was presented. A second presentation on flight muscle development under colony conditions and how this can be modified by enforced exercise demonstrated the possibility of relatively simple measures to improve the performance of released sterile flies. As part of this work the maintenance of a small population of flies in a greenhouse under essentially free-flying conditions was described; considerable progress has been achieved in this with flies feeding on an artificial lure and surviving for more than 30 days. In the third group of presentations work on the use of Samorin® as a prophylactic to prevent infection of released flies with

trypanosomes was presented. The results from Kenya and Belgium differed considerably, and the reasons for this were discussed.

Subsequent group discussion focused on developing harmonized work programmes for the remainder of the CRP. Many of the participants were able to contribute new ideas and insights to other participants and plans were prepared to resolve some of the differences highlighted by the presentations.

Research in Seibersdorf – Tsetse Flies

Colony Status

The improved performance of the *Glossina pallidipes* colony has continued through the first part of this year. The target colony size of 15 000 females was reached by week 13 and since week 11 a total of 12 000 surplus females have been added to the tsetse production unit (TPU3.2) (see below). The rate of salivary gland hypertrophy observed in the colony has fallen to about 7.5 percent from the peak of 11 percent seen late last year.

The colonies in Bratislava have also continued to grow since the beginning of the year. The *Glossina pallidipes* colony continued to decline for the first five weeks, but has now recovered to 10 692, 1300 higher than in week 1. The *Glossina fuscipes fuscipes* and *Glossina morsitans* have both grown continuously since the beginning of the year, such that the total holding in Bratislava exceeded 67 000 females by week 15. The colonies could now support some shipments to Ethiopia, but due to problems with the electrical installation in the Ethiopian rearing facility they have not been able to receive any material this year.

The improvements in the colony in both Seibersdorf and Bratislava have been attributed to the use of a new batch of blood late in 2006. Chemical analysis of the previous batch however has not revealed any significant contaminant and the actual cause of the improvement remains unknown.

TPU3.2

An initial test with one frame, holding 9 cages of *G. pallidipes* was started in week two, and when this reached 3.27 pupae per initial female (sufficient to ensure a growing colony) a number of frames of *G. pallidipes* were placed on the TPU3.2 from week 11, totalling 12 000 females. A number of problems continue to be encountered, but the most important issue of successful feeding now seems to be solved. Careful alignment of the feeding tray and membrane with the cages ensures that the cages all fit down flat on the membrane surface, coupled with adjustment of the feeding plate temperature, this has lead to effective engorgement of the flies.

We continue to make small adjustments to the design to improve the ease of use and efficacy of the system. The problem of aligning the feeding membranes with the cages is mostly due to the progressive shrinkage of the membranes with repeated washing and heat sterilizing. The membranes, which start at 640 x 640 mm, shrink by 20-25 mm over a period of three months. This shrinkage means that it is difficult to ensure that the cages (600 x 600

mm) will fit completely on the membrane. Increasing the membranes to 660 x 660 mm will ensure that sufficient tolerance is still available, even after the membranes have shrunk 25 mm. Some variation in the shrinkage was also noted with different types of netting bedded into the silicone to reinforce the membrane, leading to asymmetric shrinkage, but this is not enough to cause a problem once the large membranes are used. Other changes that have been made include changing the material for the cage arms to improve stability and for the pupal collection slopes to improve the strength and reduce weight, and providing an easier system for releasing the lock to allow the feeding trolley to move. Further improvements will be implemented as the opportunity arises.

Sexing of Pupae

As reported in the last newsletter (number 68), successive readings with the NIR (near infrared) spectrometer from a single pupa, vary considerable. To try to understand this variability we positioned pupae in the scanner in such a manner that we could rotate the pupa through a known angle about its long axis whilst keeping it in the spectrometer focal point. The pupae were mounted by gluing the anterior end to a metal rod in a holder with an index mark. This was mounted in a plate with an engraved scale, allowing the pupae to be re-positioned for repeat readings. Results from four male and four female pupae, with readings taken every 20 degrees showed that there was large variation in individual readings, which coupled with the variation with rotation, means that randomly aligned pupae will sometimes miss-classify, with female pupae sometimes giving higher values than male pupae. However in certain specific orientations (around 140 degrees in this case) the values for males and females are well separated.

Determining the position of pupae in relation to the dorso-ventral axis would be very difficult. The breathing lobes (apneustic lobes) are deflected towards the ventral aspect and in principle this could be used to determine the orientation, but the deflection is small and will be difficult to observe automatically at speed during the sorting. An alternative would be to take the reading from the anterior end of the pupa rather from the girth; this would avoid the rotational asymmetry, and it should be relatively simple to determine if the pupa is oriented with the anterior or posterior uppermost. Work will continue to determine the best conditions under which to run the sorting.

Salivary Gland Hyperplasia (SGH)

As reported in the last newsletter (no. 68), sequencing of the salivary gland hypertrophy virus (SGHV) was approached using two techniques; the shotgun method by fragmenting the genome with EcoRI restriction endonuclease resulted in 415 clones being sequenced totalling 60-90 kpb and the pyrophosphate sequencing by 454 Life Science in the USA, which gave more than 34 000 reads, assembled into 402 contigs. Intensive work has continued to combine these sequences with additional sequences extracted from the 454 data and new sequences from targeted PCR reactions, which has resulted in determining that the genome is circular with a sequence of 189 571 nucleotides. Final checking of the sequence is expected to be completed in the next few months, and the draft sequence has been submitted to GenBank (EF568108).

Two consultants group meetings were held on the analysis of the genome sequence, the first on 18-20 December 2006 under the title Genome Characterisation of the Tsetse Salivary Gland Hypertrophy Virus and the second on 11-13 April 2007 under the title "Finalizing the Genome Sequence of the Tsetse Salivary Gland Hypertrophy Virus". During the meetings the sequence data were discussed and the repeat regions found in the sequence were analyzed. Also a phylogenetic analysis of the DNA polymerase was carried out. The results of the phylogenetic analysis indicate that the predicted amino acid sequence of the DNA polymerase of SGHV was aligned with selected DNA polymerase of other large dsDNA viruses using Clustal W in BioEdit. Subsequently, a phylogenetic analysis (NJ) was performed using MEGA3.1 software.

The generated tree shows that the SGHV DNA polymerase does not cluster with the Baculoviruses or Nudiviruses, but with Iridoviruses, Herpesviruses and Phycodnaviruses. The bootstrap value for this position is very high (95 percent). Therefore it can be excluded that the SGHV DNA polymerase is phylogenetically closely related to Baculoviruses or Nudiviruses. SGHV might represent a new virus family. The virus has some genes which have homology with other insect viruses, especially the genes involved in the early infection steps like p74, pif-1 pif-2 and pif-3 of baculoviruses. Preliminary work has been undertaken to clone the p47 gene into baculovirus expression vector to produce this protein as a first step towards producing antibodies against this protein.

Another important aspect is the study of the impact of antiviral drugs on viral infection in the fly; four antiviral drugs were tested to determine their toxicity effect on tsetse. From this preliminary screening two drugs, Acyclovir and Valacyclovir, were selected for further work, the other two drugs being too toxic for use in tsetse feeding. To analyse the effect of the antiviral drugs on viral DNA replication a quantitative PCR test was established by choosing two primers and a preliminary test to quantify the number of viral DNA copies made. Work will continue on this aspect, principally using Valacyclovir.

THE INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE (ILRI)

Environment and sustainable land management in T&T intervention areas

Research on environmental and socio-economic impact assessment under the support of the United States State Department has generated a framework and methodological guidelines for assessing the impacts of T&T interventions. This work is being published in the ILRI Manuals or Guides Issue Nos, 4 and 5. This work was done with the collaboration of the PATTEC regional coordination office, PATTEC project coordinators in the six countries implementing the first phase of AfDB project, and AU-IBAR. The framework and guidelines are now being applied in Kenya to develop a baseline data base for environmental and land cover management in the PATTEC project areas, with the support of the Kenyan government through AfDB funds.

With funds expected from the National Institute of Health (NIH), ILRI in collaboration with Michigan State University will identify the linkages between climate, land use, land cover, socio-demographic factors and tsetse distribution. This work will include analysis of

the effects of climate change on vegetation and land use and land cover and how direct interventions impact tsetse distribution. These activities will provide an enhanced understanding of the impacts of climate change in tsetse systems and how these systems adapt, and develop appropriate planning and intervention scenarios for research and development to sustain livelihoods. This project will be implemented in Kenya in collaboration with the Kenya PATTEC office and will provide information replicable to other PATTEC regions.

ILRI is also working with four of the AfDB PATTEC countries to identify and apply best options for sustainable land management in tsetse-freed areas. The proposed project will identify appropriate land use practices that enhance sustainable natural resources management, agro-biodiversity, and land management strategies in tsetse-freed areas, considering the impacts of tsetse control / eradication interventions on environmental, social and economical systems and their consequences on rural development and poverty reduction. The sustainable forest, biodiversity and land management practices will provide a platform for sustainable utilization of land and economic growth to benefit rural communities where the trypanosomiasis constraint has been removed.

Twenty years of work by ILRI in the formerly tsetse-infested Ghibe Valley of South-western Ethiopia have recently been transformed into community-led livestock disease control via the formation of animal health "cooperatives". Members contribute money to a revolving fund used to buy veterinary drugs to control animal sleeping sickness. The scheme is highly successful. Hundreds of farmers line up every month to pay for the treatments and the drugs are greatly improving the health of their livestock. Farmer-to-farmer knowledge transfer is now speeding the scaling out of these community-based schemes to control livestock disease.

Improving the Management of Trypanocide Resistance

The Coordinated Regional Project on Improving the Management of Trypanocide Resistance in the Cotton Zone of West Africa which was summarized in TTI 29(1), pp. 44-45, has led to the publication of several working papers under ILRI's project publication series. Those published to date are listed below and are available from the ILRI website (www.ilri.org).

1. Grace D. Village Atelier and Participatory Rural Appraisal. Project Working Paper No. 1, February 2003.
2. Grace D. Participative trypanosomosis control in Burkina Faso: Lessons learned, ways forward. Project Working Paper No. 2, March 2003.
3. Grace D. Making Choices: Participatory planning for community trypanosomosis control. Project Working Paper No. 3, April 2003.
4. Grace D. Rational Drug Use for the management of trypanosomosis and trypanocide resistance. Project Working Paper No. 4, May 2003.
5. Grace D. Training Farmers in Rational Drug Use: Workshop Report. Project Working Paper No. 5, June 2003.
6. Grace D. Taking Stock: Monitoring and evaluation of community trypanosomosis control. Project Working Paper No. 6, December 2003.

7. Grace D. Managing trypanosomosis: Knowledge, Attitude and Practice in Upper Guinea. Project Working Paper No. 7, October 2004.

Student Theses

Affognon, H. D., 2007. Economic analysis of trypanocide use in villages under risk of drug resistance in West Africa. *PhD dissertation, University of Hanover.*

This thesis carries out an economic analysis of the use of drugs (isometamidium and diminazene) in controlling African Animal Trypanosomosis (AAT), a debilitating disease of cattle and small ruminants, in villages that exhibit resistance to isometamidium (ISMM) in Burkina Faso and Mali. We used a production function framework that integrates a damage control function to quantify cattle production losses, as well as the productivity effect of trypanocide use under different epidemiological conditions. The study was conducted from June 2003 to May 2004. Data were collected by a team of veterinary epidemiologists, agricultural economists and technicians. In all, 206 herds totalling 3565 cattle in eighteen villages were monitored during a period of 12 months. Input and output data were collected in villages for which epidemiological conditions were assessed throughout the study period. Additional price information was collected in local markets, abattoirs and through focus group discussions. The study confirms that trypanosomosis is an important disease in the cotton zone of West Africa. We found that the marginal value products of ISMM in all epidemiological conditions, and the marginal value product of diminazene (DIM) in high-prevalence-high-resistance conditions, reveal an underuse of trypanocidal drugs. The economic interpretation is that in the short term cattle farmers could increase the profitability of cattle rearing in those conditions by increasing trypanocide input beyond current levels. On the other hand, the static analysis applied in this study does not take into account the negative externality of trypanocide resistance in the future. If the use of trypanocide increases, cattle farmers will also be more likely to experience future losses from trypanocide resistance. Although drug resistance is increasing, trypanocidal drugs used are still effective against the disease. However, at the current sub-optimal level of ISMM use, output losses are much higher—9.8 percent to 22.7 percent of the value of output—than in a situation where ISMM use is optimal for all epidemiological conditions. When disease control effort reaches the optimum level, output losses are much lower—1.3 percent to 1.5 percent of output. At the current use of trypanocidal drugs, economic losses due to trypanosomosis range from €9.50 to €22.00 per TLU[1] per year. The costs of trypanosomosis at the current level of disease control effort, which include the control costs and the remaining loss after control are higher than they would be if ISMM use was at optimal levels, in all epidemiological conditions. Currently, trypanosomosis disease costs cattle farmers €13.30 to €26.00 per TLU/year; however, at optimal disease control efforts, costs would be reduced to €8.60 to €10.10 per TLU/year, depending on epidemiological conditions. While the current costs of the disease represent on average 12 percent to 28 percent of the output derived from cattle production in the study area, costs of the disease at optimal drug usage would represent only 7 percent to 8 percent of output depending on disease prevalence and drug resistance levels. Lower costs of the disease and the increasing productivity of trypanocide in conditions of high drug resistance may create an intractable situation in which cattle farmers' choices for

[1] TLU = Tropical Livestock Unit, corresponding to a bovine of 250 kg.

trypanosomosis control measures are guided by the phenomenon of path dependency. Once this occurs, the only options for controlling the disease would be the discovery of new drugs, for which the development is prohibitively expensive, or eradication of the tsetse flies, vectors of trypanosomosis—a strategy that has not been sustainable without external funding support. Maintaining the effectiveness of trypanocides is hence a priority for farming systems in West Africa.

Barry, A. M., 2006. La Trypanosomose Animale Africaine chez les Bovins N'Damas en Zone cotonnière de Haute Guinée (cas de la Préfecture de Mandiana). *Doctorat de spécialité, ISFRA, University of Mali.* [African animal trypanosomosis in N'dama cattle in the cotton zone of Guinea: The case of the Mandiana District]

In West Africa, failures in trypanocidal treatments have increased and have been found in cotton- producing regions. Chemical resistance to trypanocides has already been described in Mali and Burkina Faso. Because Guinea presents similar cattle rearing practices and has recently developed cotton production, resistance may also be suspected to exist. This hypothesis was tested in the north eastern region of Guinea by two studies. First, 1800 cattle from 30 villages located in Mandiana District were examined in a cross-sectional survey. The aim of the study was to assess trypanosomiasis risk linked to the host (cattle) and the vector (tsetse fly *Glossina*). Information on drug treatments permitted assessing the risk of resistance. The mean prevalence of infection in cattle in all the localities was 3 ± 3.84. The density of cattle was 0.7±1.08 in these villages. Concerning trypanocidal drugs, owners usually used diminazene aceturate and isometamidium chloride, both for cure and prophylaxis. However, they did not seem to be aware of their usage. One third of them treated cattle twice annually based on the symptoms. Only 40 percent of the recorded treatments were given by animal health professionals. Little information is available concerning trypanocidal drug supply, but formal and informal circuits seem to be equally involved. Second, block treatments with isometamidium chloride were performed to assess the importance and spatial trends of trypanocide resistance in Mandiana District. We chose 300 cattle in 3 villages. In each village, half of the animals (50) were treated with 1 mg/kg isometamidium chloride and the others (50) remained untreated. All the animals were monitored during 56 days and were checked by BCT method twice a month. At each control, positive animals were treated with 3.5 mg/kg diminazene aceturate for *T. congolense* and *T. vivax* infections and with 7 mg/kg for *T. brucei* infections. Early treatment failures were observed (the first two weeks of the monitoring) after treatment with isometamidium chloride for the three villages. Then, further block treatments were conducted on 1200 cattle in 10 villages around Saladou and 5 around Dialakoro, in order to assess the extent of chemical resistance in the region. In each village, half of the animals (40) were treated with 1 mg/kg isometamidium chloride and the others (40) remained untreated. All the animals were monitored during 28 days. Checking and treating positive animals were conducted as previously described. Among 15 villages, 4 failures were detected in different localities and might be attributed to treatment failure phenomena linked to the host. Third, 11 infected blood samples were collected during block treatments and 3 of them were reactivated in mice. These were *in vivo* tested for trypanocidal resistance on N'dama cattle. Among 13 calves, 9 (3 per sample) were infected and treated with 0,5mg/kg isometamidium chloride; 3 (1 per sample) were also infected but not treated (positive controls), and one remained uninfected (negative control). All calves were monitored during 100 days and no failure was

recorded in any treated calves. These results showed that treatment failures previously recorded in villages could be plausible attributed to new infections or to deficient immune status of animals and not to real resistance of trypanosome strains. Fourth, in an attempt to increase the sensitivity of diagnosis,, samples were also tested using PCR. While only 15 samples were positive in BCT, there were 78 positives using PCR indicating a 5-fold increase in sensitivity.

Dabiré, D., 2005. Sociological determinants of rural communication concerning Animal African Trypanosomosis among agropastoralists in Kenedougou Province, Burkina-Faso**.** *Maîtrise, University of Ouagadougou.*

As part of the activities of the project "Improved management of trypanocide resistance in the cotton zone of west Africa", a sociological study was conducted in 2004 in the south of Kenedougou, Burkina Faso. This study aimed at identifying and analysing socio-cultural factors that influence farmers' attitudes and strategies in their seeking information on Animal African Trypanosomosis (AAT). The methodology used was based on qualitative and quantitative surveys. In the face of persistent disease and frequent treatment failures with trypanocidal drugs, farmers and services providers have evolved a system based on multiple sources of information where drug sellers play a central role. Oral communication (95 percent) and images on the drug packaging (64 percent) are the main communication supports. Farmers use two communication strategies to acquire information: one at individual level and the other at collective level underpinned by socio-cultural habits in health and consumption management. Beyond these socio-cultural habits, three factors determine the recourse of farmers to a given source of information. These are:

- Its quality, meaning its credibility as perceived by the users (97.7 percent), proximity (88.4 percent) and availability/accessibility (84.8 percent);
- The socio-professional characteristics of the information provider: qualifications, education, experience and motivation;
- The sociological characteristics of farmers, such as ethnic group, religion, education, training, experience, and family status. Ethnic group and education appear to be the most significant factors.

However, certain socio-cultural, socio-economic, technical, professional, institutional and contextual problems encountered in daily life may bias the emitted or received information. The principal biases are due to restricted number or frequency of contacts and emerging sources that block, distort, retain and deform information. Consequently, farmers increasingly express the need for quality information on AAT.

Dao, D., 2005. Determinism of human factors in the control of Animal African Trypanosomosis: the case of the agro-pastoralists from the Department of Mandiana, Upper Guinea. *Maîtrise, University of Ouagadougou.*

This study, conducted as a Maîtrise thesis project, contributes to improving the control of African Animal Trypanosomosis (AAT) which is currently one of the major constraints to livestock development in sub-Saharan Africa. The target population was agro-pastoralists in Mandiana Department, Upper Guinea. The main objective was to understand socio-cultural

practices of agro-pastoralists and the influence of service providers in the control of AAT, and to analyse farmers' relevant knowledge, attitudes and practices. The following hypothesis emerged: the perception of AAT and its representation vary as a function of knowledge, attitudes and practices of the agro-pastoralists in Mandiana, depending particularly on whether they are small, medium or large producers and empirical experience in managing this disease. This study revealed that agro-pastoralists have partial knowledge about the causes of AAT. Of the surveyed farmers, 68 percent believe that tsetse flies are the main cause of trypanosomosis. More than 50 percent of farmers know some of the typical symptoms of AAT and 86 percent of treatments are with trypanocidal drugs exclusively. Farmer behaviour towards the disease is influenced by their experience, their cattle numbers, their level of education and access to service providers. Agro-pastoralists prefer using service providers from the formal sector, but their non availability and the high cost of their services lead the agro-pastoralists to seek for drugs and services from informal sector or treat animals themselves. Of the surveyed farmers 54 percent treat their animals themselves and 21 percent seek the services of non professionals. Nearly all treatments (99 percent) made by qualified service providers (veterinarians, technicians and paravets) were performed correctly. However, nearly half of the treatments (47 percent) performed by non professionals and by farmers were not successful. The study confirms that there is a common effort to control the AAT in this area, but many of the treatments made by non professionals are not successful. Direct training of non professionals and paravets is a crucial aspect of the problem not yet addressed.

THE LEVERHULME TRUST TSETSE RESEARCH NETWORK (LTTRN)

The Leverhulme Trust Tsetse Research Network (LTTRN) was formed in 2004 as an association of research scientists and control personnel with common interests in promoting activities in support of initiatives to control tsetse and interrupt the transmission of African trypanosomosis. The network has an underlying theme of promoting collaborative research and training to improve understanding of the biology and control of tsetse, and in support of control and surveillance activities directed against the disease and its insect vectors – especially in association with the PATTEC (Pan African Tsetse and Trypanosomiasis Eradication Campaign) initiative of the African Union.

The inaugural workshop of the LTTRN was held at the African Union (AU) Headquarters, Addis Ababa, Ethiopia, 5-6 February 2005, immediately followed by the 4th meeting of the AU-PATTEC Policy Committee during which the LTTRN was formally welcomed and adopted as the research and technical support arm of the AU-PATTEC initiative.

The network holds periodic meetings, the most recent of which was held in CIRAD/IRD Montpellier, France from 2-4 March, 2007. The objectives of the meeting were:

- To inform about current activities based in Europe that have actual or potential relevance to tsetse and trypanosomosis control (especially within the context of AU-PATTEC);
- To consider preparation of a summary paper for European funding organizations, particularly in relation to development of FP7 within the European Commission;

- To make best use of available knowledge and expertise to suggest areas of Africa where tsetse and trypanosomosis elimination might be operationally feasible, and recommend what additional research would be of significance for refining such concepts;
- To clarify the types of control interventions that are likely to be of greatest applicability over a large scale.

The meeting was attended by researchers from France, Belgium, the UK, Germany, Burkina Faso, Thailand and representatives from AU-PATTEC, TDR/WHO (Special Programme for Research and Training in Tropical Diseases of WHO) and the FAO/IAEA. Three commercial participants also attended.

Following the formal presentations several topics were discussed. Principal amongst these were: considering biological and physical conditions only in which areas was eradication most likely to be achieved; in which areas would eradication be most difficult; what effect do seasonal factors have on tsetse control, and where would these have most effect; which control techniques have the greatest applicability over the geographical scales envisaged by AU-PATTEC; in practical terms, what is the maximum area that can be controlled by the various available techniques within one season/year; what are the main geographical features that contribute to population structuring in tsetse, and if a population was removed to what extent would it be replaced by a neighbouring population; if tsetse can be eliminated from an area, how can this be confirmed; is there any evidence for genome erosion in tsetse; and given that reinfestation after local control has frequently occurred in the past, what would be the most informative markers to identify the likely source of immigration?

Amongst the results of these discussions, it was generally agreed that: isolated populations need to be identified if eradication is to be successfully maintained; isolation will be caused by topographic barriers or low rainfall areas; the scale of operation possible in one season with any technique will depend on the specific situation; the practical maximum area of an operation utilizing insecticide treated cattle would only reach the order of 10 000 km^2 in areas with good dipping infrastructure and veterinary services but could be as little as 1000 km^2 without this infrastructure; coordination and monitoring of community based control are likely to be practicable only over areas of 1-2000 km^2; and it is not clear that the necessary climatic, topographic and vegetation conditions for sustaining the effects of sequential aerial spraying, as formerly applied in Zimbabwe and recently in Botswana/Namibia/Zambia/Angola, would be found further north in Africa.

BOOK PUBLICATIONS

The Fatal Sleep

Peter Kennedy, Luath Press Ltd., The Royal Mile, Edinburgh EH1. Price approx. $US 40.
Sleeping sickness, also known as human African trypanosomiasis, is one of Africa's major killers. It puts 60 million people at risk of infection, occurs in 36 countries in sub-Saharan Africa, and claims the lives of many thousands of people every year.Transmitted by the tsetse fly, trypanosomiasis affects both humans and cattle. The animal form of the disease severely limits livestock production and farming, and in people the toxic effects of the treatment can

be as painful and dangerous as the disease itself.Existing in the shadow of AIDS and malaria, it is an overlooked disease, largely ignored by pharmaceutical companies and neglected by the western world. The Fatal Sleep traces a medical passion over 30 years, taking the reader on an exciting and captivating medical and scientific journey into Africa. Peter Kennedy has devoted much of his working life to researching sleeping sickness in Africa, and this first-hand account shares his trials and experiences, evoking our empathy with the affected patients, together with an explanation of the disease, including its history and its future. Interweaved with African geography and history, his compassionate story reveals what it is like to be a young doctor falling in love with Africa, and tells of his building of a vocation in the search for a cure for this cruel disease.

Area-Wide Control of Insect Pests: From Research to Field Implementation.

Editors: Vreysen, M. J. B., Robinson, A. S., & Hendrichs, J., 2007. Springer, Dordrecht, The Netherlands. 792 pp., 31 illustrations in colour. Hardcover ISBN: 978-1-4020-6058-8.

Price: around 190 Euro.

The world population is still growing at an alarming rate, requiring ever increasing productivity and less waste in agriculture to cope with the increasing demands to satisfy food security for all humans. Alleviation of poverty is in many countries hampered by a myriad of insect pests that cause enormous economic losses to agricultural commodities, both at the pre- and postharvest stages. Initially, most of these insect pests were controlled to a varying degree by the use of broad-spectrum insecticides. However, the indiscriminate use of these chemicals as a control tactic is no longer sustainable in view of increased development of resistance, pollution of soils and surface water, residues in food and the environment, representing risks to human health and biodiversity, etc. As a consequence, demands have been voiced at least since “Silent Spring” in 1962 for control tactics and approaches that are not only efficient, but also sustainable and friendlier to the environment. Integrated pest management (IPM) has been accepted since the 1960’s and 70s as a viable pest management strategy that aims at integrating control tactics to maintain damage levels below a certain economic threshold level whilst also protecting the environment by thriving to limit the use of pesticides. Classical IPM is however a localized approach, with the objective of protecting crops or livestock that is largely under the control of each farmer, with little collaboration or any coordinating structure. Control is exercised only in the areas of economic interest, often resulting in the main or residual pest population pockets remaining in the surrounding areas that have no economic value. These constitute permanent sources from where the commercial areas under control are re-invaded. A quite different, more efficient and sustainable approach is the integration of control tactics against an entire pest population, i.e. area-wide integrated pest management (AW-IPM) or total population management. The AW-IPM is a coordinated, sustainable and preventive approach that targets pest populations in all areas, including non-commercial urban settings, non-cultivated and wild host areas. The coordination required among farmers and all other stakeholders for an area-wide approach, makes AW-IPM programmes complex, management intensive, requiring long-term commitment and funding. Although they result in more sustainable control of insect pests, there is by no means a guarantee for success.

This new textbook on area-wide control of insect pests collates a series of selected papers that attempts to address various fundamental components of AW-IPM, e.g. the importance of relevant problem-solving research, the need for essential baseline data, the significance of adequate tools for appropriate control strategies, and the value of pilot trials, etc. Of special interest are the numerous papers on pilot and operational programmes that pay special attention to practical problems encountered during programme implementation. The book is a compilation of 66 papers that are authored by experts from more than 30 countries. Each paper was peer-reviewed by at least one, in most case two or more independent, outside experts and edited for the English language by Dr James Dargie, former Director of the Joint FAO/IAEA Programme of Nuclear Techniques in Food and Agriculture. We both thank the many reviewers and Jim whose meticulous work and suggestions improved many of the papers. In addition, the editors subjected each paper to an in-depth technical quality control process. As a result, we trust that the technical quality of the papers is optimal, the information provided accurate, up-to-date and of a high international standard. This process of peer-review, editing and formatting has taken considerable time and we appreciate the patience of the authors.

The book is organized into 8 Sections, the first of which contains two papers on "Scene Setting". This is followed by Sections dealing with Basic Research, Modelling and Methods Development, Feasibility Studies, Commercialization and Regulation, Pilot Programmes and Operational AW-IPM programmes, and finally with a Section on Lessons Learned. The book covers many insect pest species, scientific and technological developments ranging from mass rearing, cryogenics, GIS, aerial navigation technologies of pests through to transgenic approaches for their control and the challenges of commercialization and regulation of area-wide management operations. For the readers of TTI and those in general concerned with meeting the challenges posed by African trypanosomiasis, the introduction provided by Waldemar Klassen [14176] and the scene-setting papers of Hendrichs *et al*., [14173] and Pimental [14182] are well worth a read. For those more interested in basic research, the paper by Aksoy and Weiss dealing with tsetse symbionts [14189] will be valuable, while those with a bent for modeling and methods development will learn much from the papers by Cox [14168] and Boyer *et al*., [14203] to be very valuable. While there are many interesting papers dealing with the feasibility of embarking on an area-wide IPM programme involving the SIT, the papers by Kappmeier *et al*., [14211] and by Alemu *et al*., [14209] are particularly relevant for tsetse management. Finally, the paper by Vreysen *et al*., [14188] is really a "must read" for all interested in African trypanosomiasis although other species are also covered.

All these papers, as well as that by Devorshak [14169] dealing with regulation are abstracted in this issue of TTI as indicated in the square brackets. Since this book is just "hot off the press" and the editor of TTI was to some extent involved in its production, an independent review of this book must await the next volume of TTI. However, for those scientists and institutions in developing countries concerned about the price tag, the Editor suggests that contact is made with Marc Vreysen of the Joint FAO/IAEA Division (m.vreysen @iaea.org) for additional information.

DEATH FROM A FLY

By John P. Kabayo, PATTEC Coordinator

One bite,
One red site
You begin the fight
Win which you can't.
Lassitude and malaise
Fevers and a haze
For a year or more
Not letting go.
Insomnia in the night
Drowsier in the day
Pain in the head,
Might wake the dead
Rash on my trunk,
My chest and back;
More when it's hot
Or when it's not.
Muscles cramp
Glands swell
Pulses up, fevers up
Rigours and sweat.
Drowsiness to sleepiness,
Melancholy distress;
Memory fades and goes,
Coma sets in,
.....and then death.