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**ANNUAL PROJECT PROGRESS REPORT 2010**

**and**

**OUTLOOK 2011**

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## Introduction

The International Trypanotolerance Centre (ITC) is an autonomous, non-profit-making research institution, established by an act of Parliament in 1982. ITC was conceived to serve the West African region, particularly the sub-humid and humid zones. The mandate countries are member states of the Mano River Union (MRU) and the Organisation pour la Mise en Valeur du Fleuve Gambie (OMVG): Guinea, Guinea Bissau, Liberia, Senegal, Sierra Leone and The Gambia.

### Vision

The medium-term (2005-8) and long-term (2005-15) vision strategy is: ITC and partner institutions are well placed to pro-actively address current and future problems in the livestock and related sub-sectors in ways that contribute to reduction in poverty and improved livelihoods while protecting the production environment.

### Mission

The centre's mission is to act as promoter and leader in regional livestock-based agricultural partnerships that serve West African producers and consumers through the development and adaptation of innovations that support human welfare while protecting the environment. The general objective of ITC is to formulate, implement and make available to beneficiaries, a basket of options of livestock-based innovations whose adoption will lead to improved productivity and profitability and at the same time protect the environment.

The mission and objectives of ITC are consistent with and pertinent to the agricultural development policies of the West African Governments, the principles and objectives of CORAF/WECARD and CAADP of NEPAD. They are also linked to the overall research interests of African and overseas-based Advanced Research Institutes (ARIs) with interest in developing countries.

### Strategy and orientations

- To work closely with NARS partners, ARIs, IARCs and supraregional institutions in a strategic partnership mode to address the constraints to livestock-agricultural development.
- Focal point for diverse scientific collaborations on animal agriculture for the NARS within the region while ensuring the harmonisation of research strategies adapted to local production systems.
- Give high priority to training and co-ordination of other available human resources and facilities within the region.
- Co-operate with NARS in ensuring dissemination of scientific/technical information and technology transfer.
- To convince governments and donors of the importance of livestock in the socio-economic development of the countries in the region.
- To pursue regionalisation not only at the level of research and dissemination of results but also its governance to further bring in tune with regional integrating institutions of ECOWAS and UEMOA.

- Establish working links with regional and national level stakeholder organizations such as networks and producer Platforms to ensure wider dissemination of technologies and to obtain feedbacks that could feed into designing of regionally relevant research that fit the prevailing policy environments.
- Strengthen or create new strategic alliances with CIRDES, EISMV, FARA, GFAR and CG centres such as IFPRI, WARDA, IWMI and IITA.

#### Research focus and themes

The ITC research and development programme explores synergies between animal health, animal production and livestock function, and the integration of natural resources into the eco-regional context of West Africa in relation to the socio-economic situation and the physical environment. There are three institutional programmes and ten projects designed to address the priority research themes of the centre:

Institutional Programme	Institutional Project	International donors
Low-Input Systems Improvement Programme (LISIP)	IP1: Disease risk and control for improved livestock productivity	
	IP2: Strategic exploitation of indigenous animal genetic resources for sustainable development	
	IP3: Natural resource management for enhanced productivity and sustainable environments	
	IP4: Regional Project on Sustainable Management of Endemic Ruminant Livestock in West Africa (PROGEBE)	AfDB GEF/UNDP/GG
Market-oriented Systems Improvement Programme (MOSIP)	IP5: Developing meat and milk systems for market-driven enterprises	
	IP6: Appropriate feeds and feeding strategies in livestock systems for nutritional security	
	IP7: An application of biotechnology for improved animal health and production	
Systems Overlap and Linkages Improvement Programme (SOLIP)	IP8: Consumer safety and public health aspects of food production systems	VLIR
	IP9: Socio-economics and policy dimensions of livestock base agriculture	
	IP10: Training, capacity building and information exchange	

The donor funded special projects that contributed to the implementation of the ITC Institutional Programmes and Projects during the reporting period were:

**VLIR**            Epidemiology and Control of Zoonotic Infections in The Gambia and Senegal. Flemish University Development Cooperation (VLIR-UOS) Own Initiative Project. Start & duration: 1/6/06-31/10/10 (4 years 5 months).

**PROGEBE**    Regional project on Sustainable Management of Endemic Ruminant Livestock in West Africa. The project is mainly funded by GEF, AfDB,

and Governments of the four countries: Gambia, Guinea, Mali and Senegal. It has started since 2008 and will last for at least six years.

GG Gambia Government core fund

## **Low-Input Systems Improvement Programme (LISIP)**

A larger segment of the livestock-based production systems in West Africa continues to use traditional husbandry methods, whereby producers essentially rely on browses and grasses from natural pastures/range lands and crop residues for livestock feed, with very little veterinary care provided to the animals. These systems are referred to as traditional, local unimproved or low input but they provide a living for the vast majority of resource-poor farmers in West Africa. Outputs from these systems are usually only marginally to moderately larger than subsistence requirements.

Tsetse-transmitted trypanosomosis, ticks and tick-borne infections, for example anaplasmosis, babesiosis, cowdriosis, and tick-associated diseases, such as dermatophilosis, together with gastrointestinal parasites constitute the major pathological parasitic complexes responsible for limiting animal health & production in low-input systems. It is argued that indigenous livestock found in these systems have useful traits such as disease resistance, which could add to sustainability of production, if properly exploited.

The Institutional Programme 'LISIP' contributes to technological options for better exploitation of trypanotolerant and other adaptive traits of indigenous breeds of cattle and small ruminants.

### **IP1: Disease Risk and Control for Improved Livestock Productivity**

The long-term objectives of this Institutional Project are to:

- characterize indigenous ruminant livestock and their productive environment;
- conduct participatory selective breeding of indigenous ruminant breeds and to assist in the creation of community/association managed dispersed nucleus breeding herds;
- study the resistance/resilience of endemic ruminant livestock to vector-borne and other diseases and to assess under what conditions susceptible genotypes may be used in traditional low input systems.

Activities under this program have come to a halt as a result of the end of the INCO/EC project in 2008.

### **IP2: Strategic Exploitation of Indigenous Animal Genetic Resources for Sustainable Development**

The objectives of this Institutional Project are in addition to those of IP1 to:

- evaluate the biological and economic impact of stress factors that affect the stability of tolerance to diseases in pure and crossbred cattle;

- study the resistance/resilience of crossbred ruminants to vector-borne diseases and to assess under what conditions susceptible genotypes may be used in traditional low input systems.

## **IP2-1: Pure breeding programme for N'Dama cattle, Djallonke sheep and West African Dwarf goat in The Gambia**

### **Keneba Station**

#### **Management activities**

The International Trypanotolerance Centre (ITC) at Station at Keneba in the Kiang West district of Lower River Region is where the pure breeding programmes for the indigenous N'Dama cattle, West African Dwarf Goats and Djallonke Sheep takes place. Active breeding takes place on-station. It is an open nucleus breeding programme. The activities of the programme includes daily management of the herds and data collection, e.g. heat detection, control mating, monthly weighing, weekly milk measurement, recording of births and birth weights, disease treatment and prevention.

By the end of 2010, there were 375 N'Dama cattle divided into five herds with an average of 75 cattle heads/herd to ease management. The total cattle stock comprised of 281 mature females, 36 male calves, 47 female calves, 5 breeding bulls, 6 teaser bulls and 2 oxen. The small ruminant flock comprises of 7 sheep and 84 goats on station.

Selection of animals with improved genotype (elite males) and their dissemination is the main function of the station. The breeding program is on course, whilst routine management of the herds and flocks, and data on reproductive parameters were collected, collated and analysed. The pure breeding programme is designed in a three tier scheme: Nucleus, Multiplier and Farmer. Elite ruminant breeding males are selected from the nucleus herd level, disseminated to the multiplier level through the Gambia Indigenous Livestock Multipliers Association (GILMA), and eventually to the farmer level to improve the productivity of ruminant livestock. GILMA has not been active during the past two years.

A total of 88 cows were mated and 83 calves were born in 2010. Small and large ruminants were weighed on the first and third week of every month, respectively. Lactating cows were milked daily but only the yield of every Thursday is recorded. Eighty seven calves were weaned at the age of 9-12 months, and moved to Niamina East to expose them to high tsetse challenge for the next three years. Twenty four heifers were also moved from Niamina East to Keneba station.

#### **Bulls Selection and Dissemination**

Breeding values of all bulls at the age of three years in Niamina East district were estimated using a developed statistical program and records on the reproductive and growth performances. A total of 15 elite bulls with the highest breeding values were selected and presently maintained at Sololo ITC station where they are being fattened. The body conditions of these bulls have improved greatly after one month of fattening period. A Memorandum of Agreement (MOA) between ITC and PROGEBE Gambia on

the mode of disseminating these elite bulls to selected cattle breeders at the PROGEBE sites is under preparation.

### **Feeds and pasture development**

The animals are grazed on rangelands during the rainy season when pastures are abundant. Feed shortages are experienced during the dry season as a consequent of uncontrolled bush fires. In order to mitigate effects of feed shortages in the animals, *Andropogon* grasses were cut, collected and stored in November and December to feed the animals during the late dry season. Groundnut hay was also bought from farmers and stored for the late dry season supplementary feeding of target animals and to zero-graze the breeding bulls in the mating pens. Since groundnut hay and concentrates are becoming more scarce and expensive, the initiative of producing enough feeds for the animals during the dry season was launched. Eight hectares of land have been fenced for pasture development. Both *Panicum* spp and *Andropogon* grasses were grown in two hectares of this land, whilst the remaining six hectares will be developed in 2011 by PROGEBE Gambia NCU through a service contract with Animal Health and Production Unit.

### **Herd health programs**

The cattle stock were vaccinated to induce immunity against Black quarters and Anthrax whilst the small ruminants against Peste des Petites Ruminants (PPR) and Pasteurellosis. Strategic deworming interventions were applied in all animals during the rainy season. Ectoparasite control, hoof trimming, and treatment of sick animals were applied as needed. Blood and faecal samples were collected from the animals and processed at the laboratory to determine infections. Eighteen cattle were reported death during the late dry season as a result of bush fire accident that occurred in the campus.

### **Constraints and recommendations for Keneba**

- The station manager expresses the urgent need to hire a full time cleaner to take care of maintaining the campus clean.
- The staff salaries and allowances need to be augmented to commensurate with the level of work being implemented
- The small sheep flock size should be raised to substantially larger size.
- Assistant generator attendant is needed
- The 700 litres of fuel supplied to the station is grossly insufficient and needs to be increased to 1200 litres so that the generator could be run for two hours during the day time to facilitate data entry.

### **PROGEBE/ITC collaborative activities**

The Keneba ITC station continues to host the PROGEBE-Gambia Site Coordination Unit (SCU) for Kiang West district. Both ITC and SCU staff continue to collaborate on many activities such as implementation of the breeding program and pasture development. The pasture development at ITC station was contracted to Animal Health and Production Unit (AHPU) of the Ministry of Agriculture. PROGEBE-Gambia National Coordination Unit office also continued to support the breeding program by supplying fuel and cash for purchase and collection of feeds.

## **Outlook 2011**

PROGEBE is expected to rehabilitate Keneba ITC station by renovating the labs, some houses, and water system (pipes, tank, taps). The project will also construct bull mating pens, small ruminant pens, animal loading ramp, feed store, drinking troughs, training centre, and fence the camp.

The remaining six hectares of fenced land for pasture development would be developed by AHPU.

ITC is expected to restock the sheep flock, maintain the staff and foot a major chunk of the operation cost of running the station.

The intensive feed garden will be revived by planting Lucaena and Moringa to supplement the small ruminants during the dry season. The pasture fields on station will be re-established by growing improved grasses such as Panicum and Andropogon grasses.

## **Niamina Station**

Weaned male and female calves from the nucleus herd at Keneba Station are moved to Niamina Station where they are exposed to high tsetse challenge until they reach three years old. During this period, the weaners are bled monthly to measure their blood level and trypanosome infection status. They are also weighed monthly to determine their growth rate. Growth performance and tolerance to trypanosomosis traits of the weaners are evaluated at this station.

There had been lot of animal movements in and out of Niamina station in 2010. Fifty two weaners from the nucleus herd in Keneba were transferred to Niamina, whilst 28 heifers and five bulls were also moved from Niamina to Keneba. Thirty five bulls were culled and 29 mortalities were also registered largely due to trypanosomosis infection and effects of biting flies. By end of December 2010, there were four herds with total cattle population of 183: Touba 1 herd had 33 bulls, Touba 2 herd had 51 bulls, Missera herd had 52 heifers, and Sambel Kunda herd had 48 heifers.

Although no disease epidemic was reported, the animals were vaccinated against Black quarters and Hemorrhagic septicaemia in November. The animals were also strategically dewormed and infected ones were treated accordingly. The peak trypanosomosis infection rates were 47%, 56%, and 38% in October, November and December, respectively.

## **Outlook 2011**

PROGEBE Gambia is expected to renovate, equip and make the Touba laboratory functional.

## **Sololo Station**

The station manages the breeding bulls that are selected to put them in very good body condition attractive enough to cattle breeders. Fifteen bulls were moved from Niamina to Sololo on the first week of December 2010. The animals graze in the rangelands and are also supplemented daily on concentrate - a mixture of groundnut cake and rice bran. Their body conditions have improved a lot when compared to the state they were upon transfer from Niamina East.

## **IP3: Natural Resource Management for Enhanced Productivity and Sustainable Environments**

The objective of this Institutional Project is to promote the maturation of emerging livestock production systems, within view to specifically (1) elucidate further on the biophysical characteristics, economics of production and modalities of integration of *Moringa oleifera* into farming systems in The Gambia; and (2) introduce Moringa cultivation into Sierra Leone as a feed security strategy.

Although a proposal to address the above objectives was sent to IDRC office in 2009 for consideration, the unavailability of funds constrained the continuation of Institutional Project 3 in 2010.

## **IP4: Regional Project on Sustainable Management of Endemic Ruminant Livestock in West Africa (PROGEBE)**

### **Introduction**

The Regional Project for Sustainable Management of Endemic Ruminant Livestock in West Africa (PROGEBE) is born of the will of the Gambia, Guinea, Mali and Senegal to Senegal to preserve and enhance the productivity of their endemic ruminant livestock.

Due to population pressure, drought and anthropic action (deforestation, agriculture, bushfires etc.), genetic traits of trypanotolerant livestock breeds are under increasing threat of extinction or dilution. Their habitat is also increasingly being invaded by exotic livestock breeds and converted into agricultural lands with generalized deforestation due to high fuel wood demand.

Therefore, PROGEBE aims at preserving and strengthening in a sustainable manner the genetic traits of three priority endemic livestock, species (N'Dama cattle, Djallonke sheep, and the West African Dwarf goat), increasing its productivity and exploitation within an enabling physical and institutional environment. About two and a half million inhabitants in the participating countries will benefit from the project.

The project is mainly funded by the African Development Bank (AfDB), the Global Environment Facility (GEF), the Governments of member countries and its partners, ITC, UNOPS, ILRI, CIRDES and FAO. It is implemented by the International Trypanotolerance Centre (ITC) for the AfDB component, whilst United Nations Office for Project Services (UNOPS) implements the UNDP-GEF component. The AfDB and

UNDP-GEF components will last 6 years (2008-2013) and 10 years (2003-2016), respectively.

The main project partners are ministries and research institutes in charge of livestock in the four member countries: ITC in The Gambia, Agricultural Research Institute of Guinea (IRAG), Institute of Rural Economy (IER) in Mali and Senegalese Agricultural Research Institute (ISRA), ILRI based in Nairobi, Kenya, CIRDES based in Bobo-Dioulasso in Burkina Faso and FAO.

The Regional Coordination Unit is hosted by ITC in Banjul. In each country, the project operates through a National Coordination Unit, based respectively at Abuko for the Gambia, Conakry for Guinea, Bouguini for Mali and Kolda for Senegal.

In each of the four countries, five intervention sites (three primary and two secondary sites for replication of the results obtained in the primary sites) have been selected. The project covers 240 villages spread over 20 sites, including 8 priority and 12 secondary sites.

Taking into account its regional dimension, the project is supervised by: a Regional Steering Committee, National Steering Committees, and Local Steering Committees.

### **Summary of activities in 2010**

The year 2010 was determined by the validation of the baseline situation results in the Gambia, Mali and Senegal, the effective start of capacity building activities, feasibility studies of the construction/rehabilitation of civil engineering infrastructures, continued genetic improvement programs, development and implementation of research and development programs, support of beneficiaries and partners in resource mobilization, implementation of sustainable practices in Natural Resource Management (NRM), the holding of a regional workshop on Animal Genetic Resources (AnGR) management and an exchange and sharing workshop on transhumance, the development and implementation of an integrated computerized system for management and monitoring-evaluation.

The baseline situation results of the Gambia, Mali and Senegal have been validated and shared in workshops at community and national levels. These workshops were attended by all stakeholders, including professionals, technical partners, technical departments, projects in the same area and local authorities. Among the key lessons learned, the strong dominance of ERL breeds and the feminization of poverty in the project sites are in pole position.

The implementation of partnership protocols started in all countries, particularly those relating to capacity building of stakeholders. At this level, training in livestock techniques has continued in the Gambia and have been started in Guinea and Senegal. Gambia, Mali and Senegal, organized training on managing conflicts that come from the use of natural resources. In addition, training sessions on NRM techniques have been organized for environmental relays of The Gambia and Senegal. Moreover, 6 candidates-experts, including 5 to IAV Rabat and 1 in Wageningen, started their training in genetics. At the institutional level, an inventory followed by a preliminary diagnosis of existing CBOs was conducted in all countries. Senegal has, in addition, conducted a participatory institutional diagnosis (PID) of selected CBOs that will be supported.

The process of rehabilitation/construction of infrastructures began with the conduction of feasibility studies. Reports of the Gambia and Senegal, as well as their bidding documents for recruitment of construction firms, have been approved by the ADB. The studies are being finalized in Guinea and Mali.

The revival of genetic improvement programs continued with the finalization of the replenishment of cattle foundation nuclei in the Gambia, Guinea and Senegal. Mali has recovered 15 animals from the breeders and started an acquisition process of 150 cows. The identification and tagging of cattle multiplier herds are completed in The Gambia, Mali and Senegal. With regards to small ruminants, a strategy was developed, while the multiplier herds in the Gambia and Senegal were identified and tagged. The reflection on the small ruminants breeding system has led to the development of the guidance note. Moreover, the implementation of the zoo-sanitary monitoring system continued with the collection and data entry in the Gambia, Mali and Senegal. Mali and Senegal have initiated analysis of livestock data, resulting in a better understanding of the structures of the herds.

The Gambia and Senegal have started the implementation of Research and Development proposals in partnership with ITC and ISRA, respectively on the dynamic of tsetse flies population and prophylaxis of small ruminants' diseases in the project area. Mali has received approval from the ADB on its two R/D proposals, while a proposal has been submitted by Guinea.

Beneficiaries and partners received project support in mobilizing resources through GEF Small Grant program (SGP) and CORAF. In the Gambia and Senegal, in each site, a Community Based Organization (CBO) has developed a project proposal for the SGP. These proposals relate to bamboo plantation and beekeeping. In cooperation with ITC and ISRA research proposals on promotion of improved ERL and knowledge management in transhumance have been submitted to CORAF.

Practices of sustainable management of NR were implemented in 2010. They include, opening and demarcation of stock routes in one site in the Gambia and Senegal, opening of firewalls, the starting of local conventions development and /or revitalization process and installation of forage crops in The Gambia, Mali and Senegal and the revitalization of bushfires control committees.

As part of knowledge management and coordination activities, a regional workshop on the management of AnGR was organized in collaboration with FAO, with the participation of nearly 16 international organizations and representatives of Central and West African countries. The Interim Committee, resulting from this workshop and responsible for the establishment of a regional focal point for the management of AnGR, has, in addition to electronic meetings, held a meeting in Accra. Moreover, in cooperation with ILRI, an exchange and sharing meeting on the management of transhumance has been held in Bamako. The results of this workshop will be used as a basis for the preparation of a Regional Workshop on transhumance planned in 2011.

2010 was decisive in the development and implementation of the integrated and computerized system for management and monitoring-evaluation. Design and data entries have continued through multiple interactions between the Consultant and the project team

on one hand, and between members of the project team on the other hand. The system was completed and installed at the URC and the Gambia and Senegal UNCs.

On the budgetary side 65% of the 2010 budget has been executed with respectively 54, 84 and 72% for AfDB, GEF and States funds.

Major challenges faced by the project during the implementation of this year Annual Work Plan Budget are related to the slow procurement procedures of donors and states, including recruitment of firms in charge of feasibility studies for civil engineering infrastructures. In addition, the length of negotiations of partnership protocols and long delays in transferring partners' first disbursements has also delayed the implementation of activities. Moreover, the political situation that prevailed in Guinea slowed the speed of execution of project activities in that country.

### **Outlook 2011**

The outlook of 2011 along the six strategic intervention lines is as follows:

#### **Strategic intervention line 1. Preservation of genetic characteristics and improvement of production and productivity of endemic ruminant livestock (ERL)**

The actions to be undertaken will be aimed specifically at:

1. completing the updating of the baseline situation;
2. rehabilitating the infrastructure of the stations hosting the foundation nuclei;
3. continuing the strengthening of the skills of the project team and agro-pastoralists in livestock techniques and genetics;
4. strengthening the institutional capacity of agro-pastoralists organizations.
5. continuing to improving the provision of required outreach services (veterinary services, inputs, equipment, financial services, etc.);
6. starting the genetic improvement of small ruminants.

#### **Strategic intervention line 2. Improvement of the valorization (marketing and commercialization) of ERL and its products**

The aim of the planned activities will be to:

1. complete the updating of the baseline situation, improve the animal productions marketing strategies and conduct complementary studies on ERL marketing opportunities and constraints;
2. rehabilitate and equip 17 slaughtering areas, 19 livestock markets, 11 mini-dairies and 100 km of feeder roads;
3. set up, with collectivities and professionals, more sustainable management systems of the 47 processing and marketing infrastructures;
4. strengthen the technical and institutional capacities of professionals;
5. define and implement a strategy to support fairs and competitions;
6. define a strategy for the establishment of a market information system.

#### **Strategic intervention line 3. Sustainable management of ERL ecosystems**

The objectives will be mainly:

1. to complete, in Mali and Guinea, the updating of the baseline situation and improving the sustainable natural resources management strategies;
2. to strengthen the technical and institutional capacities of communities for the promotion of local conventions of sustainable ERL ecosystems management;
3. to implement the environmental monitoring and surveillance system through partnerships with specialized institutions.

#### **Strategic intervention line 4. Legal, policy and institutional frameworks**

The objectives in 2011 are particularly to:

1. continue the consultations, awareness raising and training for the effective mobilization of communities and authorities in the sustainable management of their land;
2. share the results of the review of laws and regulations about natural resources management;
3. promote concerted mechanisms for animal genetic resources and transhumance management in the sub-region through the holding of two regional workshops;
4. promote exchanges with actors, at national and regional levels, for concerted approaches to promote and implement ERL enabling policies, regulations and laws;
5. support the formalization of CBOs and their institutional strengthening.

#### **Strategic intervention line 5: Cooperation, knowledge management, exchange and coordination**

The aim of the 2011 program will be to:

- continue the maintenance and animation of the project website;
- continue the regular publication of the electronic newsletter and periodical activities reports;
- strengthen the initiated networks;
- promote exchange of information for coordination purposes, mutual reinforcement and lobbying.

#### **Strategic intervention line 6: Project Management**

For 2011, it is planned to continue the following:

- plan project activities in a concerted manner;
- ensure the diligent implementation of the work Plan with emphasis on partnerships monitoring;
- mobilize in time, resources needed to implement the project;
- manage project resources in a transparent and efficient manner;
- collect, process and analyze project implementation monitoring and evaluation data;
- ensure the visibility of the project.

## **Market-oriented Systems Improvement Programme (MOSIP)**

Programme goals of MOSIP are the promotion of improved and sustainable livestock production, processing and marketing technologies in medium to high input systems in West Africa through the optimization of farm and market resources.

### **IP5: Developing Meat and Milk Systems for meat and milk production in urban and peri-urban areas**

The overall objective of the Project is to develop, evaluate and integrate crossbreds and other improved breeds in market-oriented farming systems for meat and milk production in urban and peri-urban areas, as a strategy for improving milk and meat production to meet the demands of the growing human population.

#### **IP5-1: Monitoring and management of ITC's on-station dairy cattle herd**

##### **Background**

Experimentation on the production and rearing of F1 crossbred for dairying was started in ITC in the 1990ties. The first batch of F1 crossbreds (N'Dama cow x Jersey; N'Dama cow x Holstein Friesian) was produced in 1995, and subsequent batches in 1996 and 1997. This initial production and rearing of these crossbred cattle was supported from ITC core funds. Later, various donors supported specific on-station research activities or experiments as in line with their project objectives. By 1999-2000 the technology of crossbred production and rearing for dairying was transferred to on-farm involving small commercial farms and farmers living in the peri-urban areas where tsetse challenge is low.

The 1995 and 1996 produced F1 batches formed the dairy herd at ITC Kerr Serigne which serves as a demonstration and experimentation site. The herd profile, size and financial support registered a gradual decline over the years. As of January 2010, the herd consisted of 13 F1 cows, 1 F2 heifer, 5 weaners, and 11 calves. The weaners and calves are backcrosses of F1 cow and N'Dama bull. Four F1 cows died in September/October 2010 thus by December 2010 the herd size stood at 26 crossbreds.

##### **Activities implemented**

Data was collected on the mortality, disease occurrence, treatments, vaccinations, milk off-takes, calvings, weanings, matings, and weights. This data was collated and analysed to give milk production statistics and herd performance in 2010. The animal was refurbished to adequately shelter the animals from direct heat of the sun and pouring rains. This improved the health status of the animals and facilitated monitoring, and management interventions.

The herd was vaccinated against Hemorrhagic septicaemia and Black quarters in June 2010. Deworming of the animals was done using albendazole suspension in July and September 2010. Ticks infestations on the animals were controlled by weekly spraying with Amitraz Intraz-125EC

The dry season feeding regime for the F1 herd consists of grazing and supplementation. The lactating F1s were given 2 kg of concentrate feed (mixture of groundnut cake, brewers spent grains, and rice bran) every morning before milking. Animals were let out to graze within the ITC premises until 1:00 p.m. and then fed on collected *Andropogon* grasses. The rainy season feeding regime of the F1 herd is similar to the dry season feeding regime except that *Andropogon* is not given but they graze longer on green pastures within the ITC premises until 4:30 p.m.

Milking of lactating cows was done every morning and evening using hand milking method. Collected milk was sieved and packaged in one litre plastic bags and sold at the local dairy unit. A total of 6,119 litres of milk was obtained from the herd in 2010. The milk yield for 2010 was 3,738 L less than the yield for 2009. The difference is attributed mainly to the fewer number of lactating cows (8 in 2010) versus (12 in 2009). The monthly total milk yield in litres for 2010 is shown in Figure 1. The observed increasing monthly milk production matched the calving trend. One calve was born in March, four in August, one in November and the last one in December.

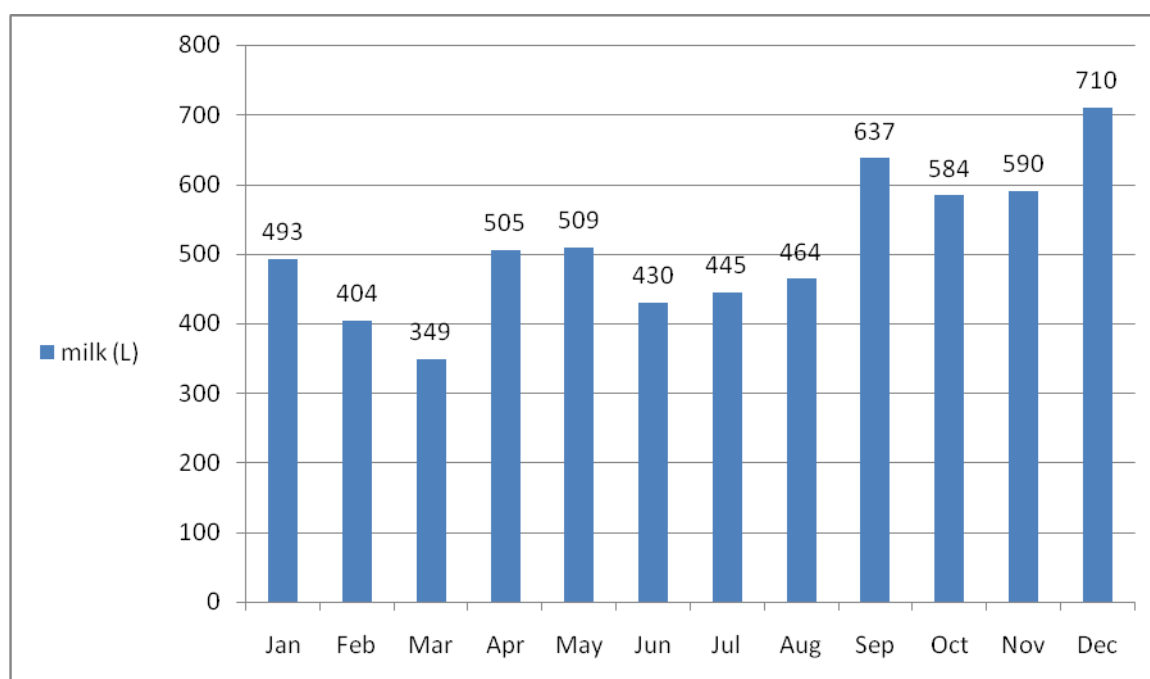


Figure 1. Total monthly milk yield for the year 2010

The average daily yield per lactating cow is estimated at 2.0 litres valued at GMD60.00.

#### *F1 Stock Replacement Scheme*

The implementation of F1 Stock Replacement Scheme began 2010 after obtaining cows for insemination. Twenty N'Dama cows selected from the ITC herd at Keneba were brought to ITC Kerr Seringe station in January 2010. Nine cows were culled due to poor Body Condition Score and old age during the conditioning period for artificial insemination. Three cows that came into oestrus were inseminated with Holstein-Friesian semen in May and June 2010. The inseminated cows did not return to oestrus 21 days post insemination suggesting that they have conceived. Signs of oestrus were not visually detected in the remaining eight N'Dama cows during the last half of 2010. Visual

detection of oestrus in N'Dama cows is not very reliable as many animals exhibiting silent heat would be missed.

#### *Education and Extension Role*

Many students from Senior Secondary Schools and the University of The Gambia were received at the F1 herd in 2010. The production and management of crossbred F1 cattle in peri-urban dairy production systems were explained at different depths depending on the academic levels of the different visitors.

#### **Constraints affecting the herd**

Many old unproductive F1 cows in the herd  
Production of replacement F1s is virtually very slow  
Non detection of cows exhibiting silent heat by visual observation  
High cost of liquid nitrogen for maintaining semen stock viable

#### **Outlook 2011**

The F1 Stock Replacement Scheme will be revitalized to ensure that at least 20 F1 calves are produced by end 2012 so as to increase milk production for the sustainable running of the F1 herd.

#### **IP5-2: Management of ITC's Goat Flock**

##### **Background**

The International Trypanotolerance Centre (ITC) has been the executing institution for research on the IDRC Sponsored project since mid 1990. The three phase project started in 1996 and terminated in 2009. Phase three of the project used some goats as experimental animals to test the anthelmintic properties of *Moringa Oleifera* locally known as Never Die. These goats constitute the present goat flock that is under multiplication at Kerr Seringe ITC station.

##### **Implemented Activities**

After identifying an ideal place at the Kerr Seringe station, a number of contracts were awarded to construct a wire walled house with corrugated iron sheet roof and rhun palm raised platform. The whole pen measures 36.40 meters by 12.80 meters and is divided into four compartments: goat area, sheep area, weighing area, and free flat floor space as roaming area. The pen construction started in May and then completed in June 2010 in time before the onset of the rains.

The total number of goats as of December 2010 stood at 28 comprising of six males and 22 females. All young males were castrated to prevent inbreeding, and the breeding buck was also changed. The last monthly weighing in December 2010 indicated that the weights vary from 3.2 kg to 34 kg.

Health interventions such as disease treatments, vaccination against Peste des Petites Ruminants, ticks control, and deworming were also carried out to maintain a healthy and productive goat flock.

The kiddings and exits recorded during 2010 are as follows:

Months	Number of Does	Number of Kids		Number of Exits		Cause of exit
		Females	Males	Females	Males	
January	1	1	1	0	0	
February	1	1	1	0	2	Death, Sales
March	1	0	2	1	2	Death
April	0	0	0	1	0	Sales
May	0	0	0	1	0	Sales
June	8	6	6	0	1	Service buck changed
July	0	0	0	1	0	Death
August	0	0	0	0	1	Death
September	0	0	0	0	0	
October	1	0	2	1	1	Death
November	0	0	0	0	5	Sales
December	1	0	2	1	1	Death, Sales
Total	13	8	14	6	13	9 Deaths, 10 Sales

### Outlook 2011

Experimental trials would be initiated on the goat flock and the possibilities of starting a sheep fattening research program will be explored.

### IP6: Appropriate Feeds and Feeding Strategies in Livestock Systems for Enhanced Nutritional Security

The objectives of this Project are to develop feeding and management strategies in support of evolving production systems by (1) strengthening the feed resource base of urban integrated farming systems; (2) evaluation of in-vitro dietary combinations for urban livestock nutrition; (3) on-farm testing and technology transfer of supplementation and nutrient recycling options.

No activities were conducted under this institutional project due to inadequate human and financial resources.

### IP7: Application of Biotechnology for Improved Animal Health and Production

The objectives of this Institutional Project are to:

- enhance molecular diagnostic capabilities of ITC for epidemiological investigations of selected diseases of regional importance;
- create and strengthen institutional capacity in using DNA-based technologies for molecular characterization of i) pathogens, and ii) indigenous livestock resources;
- strengthen collaborative linkages of ITC with Advanced Research Institutes and with scientific networks for development and use of relevant agricultural biotechnologies in livestock research for development.

Molecular characterization of Brucella and Salmonella isolates is reported under IP8.

## **Systems' Overlap and Linkages Improvement Programme (SOLIP)**

The crosscutting nature of this Programme addresses the enhancement of human welfare (food security, quality of life, disposable incomes) and livelihoods through the use of improved technologies, methodologies, policies and information generated through innovative collaborative research and training in three distinct areas:

1. Adoption of socio-economically appropriate technological options and methods generated in partnership with stakeholders;
2. Epidemiology and risk assessment of diseases of veterinary public health importance, food safety issues; and
3. Training, capacity building and information exchange.

### **IP8: Consumer Safety and Public Health Aspects of Food Production Systems**

This Institutional Project addresses the identification and assessment of the importance of public hazards (zoonotic diseases), their impact on consumer safety, and development of recommendations for control and preventive measures.

#### **IP8-1: Epidemiology and Control of Zoonotic Infections in The Gambia and Senegal**

The 4-year research project financed by VLIR-UOS, the University Development Cooperation of Belgian-Flemish Universities, and implemented by ITC, ITM and Antwerp University in close collaboration with partner institutions in The Gambia and Senegal, started on 1 June 2006 and terminated in October 2010. The final report is shown below:

##### **1. Basic data**

Name of promoter: Eric Van Marck Name of university: Universiteit Antwerpen Country: The Gambia <b>Project title: Epidemiology and control of Zoonotic infections in The Gambia and Senegal</b> Local partner institution: International Trypanotolerance Centre, Banjul, The Gambia Duration: 4 years (1 June 2006 - 31 October 2010) Extension approved (1 June until 31 Oct 2010) Period of reporting: whole period Total approved budget: 309,320.00
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##### **2. Brief summary of the objectives of the activity**

*Development overall objective:* contribute to the well being of the local population through human health and increased productivity of livestock

***Academic overall objectives:***

- Strengthen the capacity and the capability to diagnose and control zoonotic diseases of livestock

***Specific objectives:***

- Develop recommendations for sustainable control of specific zoonoses, which can be taken up by the extension services
- Increased productivity of livestock and decreased risk for transmission of zoonotic infections from livestock to people

***Intermediate results***

1. Intermediate results related to research

- Outcome 1: Epidemiological studies undertaken 1) to determine the prevalence of brucellosis, salmonellosis, and cysticercosis in cattle and 2) to study the risk factors of these three zoonotic diseases (The Gambia and Casamance, Senegal)
- Outcome 2: Epidemiological studies undertaken 1) to determine the prevalence of salmonellosis and cysticercosis in pigs and 2) to investigate their risk factors under local production and management conditions (Casamance, Senegal and Western division of The Gambia)
- Outcome 3: Epidemiological studies undertaken 1) to determine the prevalence of salmonellosis in poultry and poultry products and 2) to study the risk factors of salmonellosis (The Gambia and Casamance, Senegal)
- Outcome 4: appropriate control packages are designed, implemented and monitored in selected areas in The Gambia and Senegal

2. Intermediate result related to capacity building

- Outcome 5: The laboratory of ITC is fully operational for bacterial and serological tests of selected zoonotic diseases
- Outcome 6: A better understanding is achieved of the epidemiology and control of salmonellosis, brucellosis and cysticercosis

3. Intermediate result related to extension

- Outcome 7: Packages for prevention/control of zoonotic diseases transferred to the extension services in The Gambia and Casamance (Senegal)

During the extension phase of the project (June - October 2010) the objective was to ensure that the PhD candidates could defend their thesis.

### 3. Overview of the activities which were realized during the period 2006-2010

Table 1. Planned activities of the project and degree of realization

Description of the activities	Realisation
<b>1. Epidemiological studies undertaken in cattle - outcome 1 of intermediate result 1 related to research</b>	
1.1 elaborate research and operational plans including sites selection, sampling frames, protocols and supplies	1.1. Fully realized
1.2.organise field studies: sampling at abattoir and sampling and questionnaires at village level	1.2. Partially realized, no sampling at abattoir <sup>1</sup>
1.3. test samples for brucellosis: ELISA for antibody detection; cysticercosis: both antigen and antibody ELISA; salmonellosis: bacteriological examinations	1.3. Samples tested only for brucellosis <sup>2</sup>
1.4. analyse and map (GIS) the collected data	1.4. Fully realized
<b>2. Epidemiological studies undertaken in pigs - outcome 2 of intermediate result 1 related to research</b>	
2.1 elaborate research and operational plans including sites selection, sampling frames, protocols and supplies	2.1 Fully realized
2.2.organise field studies: sampling at abattoir and sampling and questionnaires at village level	2.2. Fully realized
2.3. test samples for brucellosis: ELISA for antibody detection; cysticercosis: both antigen and antibody ELISA; salmonellosis: bacteriological examinations	2.3. Samples tested for only cysticercosis <sup>3</sup>
2.4. analyse and map (GIS) the collected data	2.4. Fully realized
<b>3. Epidemiological studies undertaken in poultry - outcome 3 of intermediate result 1 related to research</b>	
3.1 elaborate research and operational plans including sites selection, sampling frames, protocols and supplies	3.1 Fully realized
3.2.organise field studies: sampling at markets and sampling and questionnaires at village level	3.2. Fully realized
3.3. test samples: bacteriological examinations	3.3. Fully realized
3.4. analyse and map(GIS) the collected data	3.4. Fully realized
<b>4. Control packages<sup>4</sup> - outcome 4 of intermediate result 1 related to research</b>	
4.1 select areas where intervention studies will be carried out	4.1. Not realized <sup>4</sup>
4.2 design sustainable, socio-economically and environmentally acceptable integrated packages for prevention and control of zoonotic diseases	4.2. Fully realized
4.3 organise samplings in the study sites	4.3. Not realized
4.4. Implement interventions in the study sites	4.4. Not realized
4.5. monitor efficacy (e.g. compliance) of interventions at appropriate intervals	4.5. Not realized
4.6 analyse samples (Ag and Ab-ELISA, bacteriological examinations)	4.6. Not realized
4.7 analyse results, adjust intervention strategy if necessary, prepare	4.7. Not realized

reports	
<b>5. The laboratory of ITC is fully operational – outcome 5 of intermediate result 2 related to capacity building</b>	
5.1 complete the diagnostic equipment of the ITC laboratory	5.1. Fully realized
5.2 transfer diagnostic techniques to ITC	5.2. Fully realized
5.3 training of three technicians in diagnostic techniques for brucellosis, salmonellosis and cysticercosis	5.3. Fully realized
5.4 diagnostic tests for selected zoonoses carried out as required	5.4. Fully realized
<b>6. A better understanding is achieved of the epidemiology and control of salmonellosis, brucellosis and cysticercosis – outcome 6 of intermediate result 2 related to capacity building</b>	
6.1 selection of three suitable students	6.1. Fully realized
6.2 development of research plan for each of the students	6.2. Fully realized
6.3 course attendance of MSc students at ITM	6.3. Not realized <sup>5</sup>
6.4 study visits of Ph D students to UA/ITM (three per student, each up to 2 months, individual timing)	6.4. Partially realized
6.5 participation at international conferences to present research results	6.5. Fully realized
6.6 publication of research results in peer-reviewed scientific journal	6.6. Partially realized
6.7 the research progress is monitored according to PCM principles and academic requirements	6.7. Fully realized
<b>7. Packages for prevention/control of zoonotic diseases transferred – outcome 7 of intermediate result 3 related to extension</b>	
7.1 packages prevention/control of zoonoses are formulated in a suitable way for use by the extension services and illustrated leaflets/posters produced	7.1. Fully realized
7.2 organise meetings with extension services and other stakeholders	7.2. Fully realized
7.3 organise a workshop with extension services and other stakeholders	7.3. Fully realized
7.4 monitor extension activities for sensitisation and training of farmers	7.4. Partially realized
<b>Project management activities</b>	
1. Kick-off workshop	1. Realized
2. visits by Flemish promoters/experts to assess the situation of the three zoonoses in the region	2. Realized
3. visit of local promoter to institutes of Flemish promoters	3. Not realized <sup>6</sup>
4. monitoring and evaluation according to PCM/Academic requirements	4. Not realized <sup>7</sup>
5. six month progress report	5. Not realized
6. annual progress and financial report	6. realized
7. final report	7. realized
<b>Additional unforeseen activities in the original project</b>	

<b>document:</b>	
Investigation of the three zoonoses in humans in the selected study sites	realized

- <sup>1</sup>: the original planned activity to sample at abattoir was removed during the elaboration of the final proposal
- <sup>2</sup>: only brucellosis was studied in cattle as was recommended during the kick-off workshop
- <sup>3</sup>: only cysticercosis was studied in pigs as was recommended during the kick-off workshop
- <sup>4</sup>: at the mid-term evaluation of the project it was realised that there was not enough time to implement the intervention studies. The VLIR secretariat was informed about this change of the programme
- <sup>5</sup>: instead of 1 MSc student and 2 PhD students it was decided to select 3 PhD students. That is the reason why there was no MSc course attendance.
- <sup>6</sup>: due to frequent changes in the direction of ITC and consequently also in the local promoters there was no opportunity for a visit to Belgium. However, this was not strictly necessary and it has not negatively influenced the outcome of the project
- <sup>7</sup>: the Belgian and local promoters did agree that a 6-month progress report was not necessary because there were intensive contacts between them via e-mail allowing a good follow-up of the project activities

The majority of the planned activities in table 1 were realized and some new unplanned activities were implemented, but certain planned activities were not realized for reasons as explained below.

Although originally it was planned to study cysticercosis and brucellosis in cattle and pigs and salmonellosis in 3 animal species (cattle, pigs and poultry; activities 1, 2 and 3) it was decided during the kick-off workshop with the stakeholders that it would be more relevant and more efficient to focus the research on the most important species for each of the 3 zoonoses, i.e. cattle for brucellosis, pigs for cysticercosis and poultry for salmonellosis.

Activity 4 (intervention studies using locally designed control packages) was not realized. The main reason for not implementing this activity was lack of time. However, under activity seven, sustainable control/prevention packages were developed and leaflets were produced that were distributed to the extension agencies in The Gambia and Senegal. Three restitution workshops were organized in 2010 (Western region in The Gambia, Kolda and Ziguinchor in Senegal). Extension agencies, NGOs, farmers, medical services and other stakeholders were gathered during these workshops to disseminate our research findings and control/prevention packages for the three zoonotic diseases studied (brucellosis, cysticercosis, and salmonellosis). Although many farmers were trained and sensitized on the control/prevention of the three zoonotic diseases, unfortunately, we could not monitor the extension activities for further sensitization and training of farmers (activity 7.4) due to lack of time.

Despite the cancelling of some planned activities we added an activity which was not foreseen in the project document, i.e. the study of the 3 zoonoses in the human population. During the kick-off workshop the local stakeholders insisted very much to carry out some investigations on the impact of the 3 zoonoses on public health. This proposal was unanimously accepted because a research project on zoonoses which would only study the animal aspect would only partially fulfil its objectives.

#### 4. Budget

In table 2 the total amount which has been spent during the 4 years of the project and five months extension period is compared with the foreseen budget. Eighty four percent of the overall budget of €309,320.00 has been used. The fact that only about half of the budget for investments has been used is rather misleading because a lot of smaller equipments which were mentioned as investments in the original project document were eventually categorised as expenses under 'operations'. The budget for international travel was underutilised because the local promoters from The Gambia did not come to Belgium. This was due to frequent changes of the direction of ITC which made that neither the director of ITC nor the local coordinator of the project found the time to visit the institutes of the Belgian promoter and co-promoter. The higher expenses for residential costs (14,159 instead of 8,424 €) are due to the fact that the project covered two countries (The Gambia and Senegal). Therefore, regular missions from Banjul to Casamance were necessary which explains the higher expenses for hotel and accommodation costs.

Table 2. Overview of the expenses during the whole duration of the project (preliminary figures)

Budget lines	Foreseen (€)	Spent (€)	Difference (€)
Investments	44500	22565,67	21934,33
Operations	93000	94297,26	-1297,26
Scholarships	111756	102802,40	8953,57
International travel	14000	4706,54	9293,46
Residential costs	8424	14159,08	-5735,08
Shipping	3000	746,03	2253,97
Margin of insufficient budget (5%)	10000	2637,54	7362,46
Coordination	24640	16574,40	8065,60
<b>TOTAL</b>	<b>309320</b>	<b>258489</b>	<b>50831,05</b>

#### 5. Overall performance of the project

The general and at least one of the specific objectives of the project have been achieved. It is very difficult to estimate whether or not the productivity of livestock has increased and whether the risk for transmission of zoonotic infections from livestock to people has decreased (specific objective no. 2). Anyway, it can be assumed that the farmers have been intensively sensitised in the study areas of the project which in the long run should result in better control of zoonoses and increased productivity.

New epidemiological data, especially the molecular characterization of bacterial strains (*Salmonella* and *Brucella*) and parasite species, were provided on the three zoonotic diseases studied. The prevalence and risk factors of the three zoonotic diseases in animals were either updated or newly reported in both The Gambia and Senegal. Cysticercosis in pigs was reported for the first time in The Gambia (see publication list). Furthermore, the presence of neurocysticercosis in the human population of the Casamance was rediscovered (first report after 35 years).

Unforeseen diagnostic tests such as molecular and imaging techniques were implemented to provide additional information to better understand the epidemiology of the diseases in both animals and humans. Results of the studies were published or submitted to peer-reviewed journals (Appendix 1) and presented in four international conferences, three sub-regional restitution workshops, and three national conferences.

A major achievement of the project was the training of 3 PhD-students within the framework of the project which resulted in the successful defence of 3 PhD-theses within a period of 4 years and 5 months.

The following indicators were put forward in the logical framework of the project:

*1) ITC laboratory was upgraded, operational and three technicians trained on diagnostic of the three diseases*

Two lab technicians of ITC and one lab technician from the Department of Livestock Services (The Gambia) were trained on laboratory diagnostic techniques for the three zoonoses at ITM, Antwerp, CERVA (Brussels) and the University of Antwerp, respectively. ITC is now able to carry out appropriate diagnostic tests for the three diseases. The lab technician from the Department of Livestock Services assisted in the laboratory diagnostic activities of salmonellosis and brucellosis.

*2) Three leaflets on guidelines for control/prevention of the three studies were made available to the extension services and farmers of both countries*

This indicator has been realized.

*3) The burden of three zoonotic disease in pigs, poultry and cattle were determined and risk factors studied in selected areas in The Gambia and Senegal*

This indicator has been realized.

*4) Training of three PhD students in the field of cysticercosis, salmonellosis and brucellosis, respectively*

One MSc and two PhD students were foreseen, but finally three PhD students were trained. All three PhD students defended their theses successfully at the University of Antwerp. Three PhD theses and five peer-reviewed articles were published until now. Several other manuscripts are ready for publication.

*5) Meetings and workshops with extension services were organized*

Several meetings with the extension services and farmers were organized throughout the project implementation, and a final restitution workshop was organized at the end of the project. This enabled us to involve the stakeholders in all project activities planning and implementation.

*6) Research network established with national and international partners*

Two memoranda of understanding were signed in The Gambia between ITC and the Medical Research Council (UK), and between ITC and the Department of Livestock Services. In Senegal, one memorandum of understanding was signed between ITC and the 'Direction de

l'Elevage'. Research collaborations were established with the Royal Victoria Teaching Hospital (The Gambia), Pasteur Institute, Veterinary School and Ministry of Health (Senegal), Institute for Parasitology, Zurich University (Switzerland), Department of Animal Health at ITM (Belgium), University of Antwerp and CERVA (Belgium). One of the PhD students also became member of the Cysticercosis Working Group for West and Central Africa (Arss Secka), and one of the American Society for Microbiology (Michel M. Dione).

The following problems were encountered:

- The lack of enough time for implementation of activity four (control package).
- Budget allocated to board and lodging was underestimated leading us to limit or join field missions which were not very convenient for implementation.
- Absence of local scientific promoters during the second half of the project to facilitate and coordinate the activities.

## 6. Perspectives

The baseline data generated could form the basis for formulating new projects at national and regional levels in the field of the epidemiology and control of zoonotic diseases. Capacity strengthening of ITC labs (serology and microbiology) and three lab technicians has greatly improved the strength of ITC at diagnosing zoonotic infections in the West African sub-region. The three graduated PhD students are currently working at the national veterinary services or at an international research centre (MRC, Banjul).

## Appendix 1. Publications list

### PhD theses

- BANKOLE, A.A. (2010). Bovine brucellosis in The Gambia and Senegal: Risk assessment of human infection from raw milk consumption. PhD thesis. University of Antwerp
- DIONE, M. M. (2010). Epidemiology of Non-typhoidal *Salmonella* (NTS) in humans and animals in the Gambia and Senegal. University of Antwerp
- SECKA, A. (2010). Epidemiology of *Taenia solium* cysticercosis in The Gambia and Senegal. PhD thesis. University of Antwerp

### Articles in peer reviewed journals

- Bankole, A.A., Saegerman C., Berkvens D., Fretin D., Geerts S., Ieven M. and K. Walravens (2010). Phenotypic and genotypic characterisation of *Brucella* strains isolated from cattle in The Gambia. *Veterinary Record* 166: 753-756
- Bankole, A.A., Secka A. and C. Ly. 2010. Risk behaviours for milk-borne diseases transmission along the milk chain in Gambia and Senegal. *Tropical Animal Health and Production* DOI: 10.1007/s11250-010-9660-9.
- Dione, M. M., Ieven, M., Garin, B., Marcotty, T. and S. Geerts (2009). Prevalence and antimicrobial resistance of *Salmonella* isolated from broiler farms, chicken carcasses, and street-vended-restaurants in Casamance, Senegal. *Journal of Food Protection* 72: 2423-2427

- Secka A., F. Grimm, B. Victor, T. Marcotty, R. De Deken, O. Nyan, O. Herera, E. Van Marck5 and S. Geerts (2010). Epilepsy is not caused by cysticercosis in The Gambia. *Tropical Medicine and International Health* 15: 476–479.
- Secka A, Marcotty T, De Deken R, Van Marck E, Geerts S (2010). Porcine cysticercosis and risk factors in The Gambia and Senegal. *Journal of Parasitology Research* doi10.1155/2010/823892

### Submitted articles

- Dione, M. M., Geerts, S. and M. Antonio (2010). Identification of novel clones of multiply antibiotic-resistant *Salmonella* recovered from poultry in Senegal by multilocus sequence typing. Submitted to *Journal of Medical Microbiology*
- Dione, M. M., Ikumapayi, U. N., Debasish, Saha., Ebrahim, N., Geerts, S. Ieven, M., Adegbola, A. A. and M. Antonio (2010). Clonal differences between Non-Typhoidal *Salmonella* (NTS) strains from humans and animals living in close contact in The Gambia. Submitted to *Applied and Environmental Microbiology*
- Dione, M. M., Ikumapayi, U. N., Debasish, Saha., Ebrahim, N., Geerts, S. Ieven, M., Adegbola, A. A. and M. Antonio (2010). Detection of virulence genes in Non-Typhoidal *Salmonella* (NTS) isolated from different sources in The Gambia and Senegal. Submitted to *Annals of Clinical Microbiology and Antimicrobials*
- Secka A., Grimm F., Marcotty T., Geysen D., Niang A. M., Ngale V., Boutche L., Van Marck E. and S. Geerts. (2010). Old focus of cysticercosis in the village of Soutou in Senegal revisited after half a century. Submitted to *Acta Tropica*.
- Secka A. and S. Geerts (2010). Pig Production and Marketing Chain in relation to Cysticercosis in The Gambia and Senegal. Submitted to *Tropical Animal Health and Production*.

### Articles in preparation

- Bankole, A.A., Saegerman C., Ieven M., Geerts S., Akakpo A.J., Fretin D., Nyan O., Leigh O., Bojang T. and D. Berkvens. Prevalence of Bovine brucellosis in Western region (The Gambia) and Kolda (Senegal) and human brucellosis in villages with serologically positive herds.
- Bankole, A.A., Berkvens, D., Saana, M., Ieven, M., Geerts, S. and C. Saegerman. Risk assessment of human brucellosis from raw cow milk sold by vendors in The Gambia.

### Posters presented at conferences

- Bankole, A.A., Berkvens D., Fretin D., Geerts S., Ieven M. and C. Saegerman. 2010. Bovine and human brucellosis in The Gambia: First characterisation of *Brucella* isolates. Poster presented at the annual conference of the *Society for veterinary Epidemiology and Preventive Medicine (SVEPM)*, 24 – 26 March 2010, Nantes, France.
- Dione, M. M., Schoenefeld, A. Geerts, S. and M. Ieven (2008): Methodological Approach of Epidemiological Investigation of *Salmonella* along the Broiler Poultry Supply Chain in Senegal. 5th -9th May 2008: poster presented at the

International Conference on Re-enforcement of the Competitivity in the Semi-industrial Poultry Farming in Africa (CIASA), Dakar, Senegal.

### Abstracts and conference proceedings

Dione, M. M., Ieven, M., Garin, B., Marcotty, T. and S. Geerts (2009). Prevalence and antimicrobial resistance of *Salmonella* isolated from broiler farms, chicken carcasses, and street-vended-restaurants in Casamance, Senegal. 5th to 9th October 2009: 3rd American Society for Microbiology Conference on *Salmonella*, Aix en Provence, Marseille, France. ASM conferences, *Salmonella: Biology, Pathogenesis and Prevention*, p46, abstract n° 55A, 139p.

### IP9: Socio-economics and Policy Dimensions of Livestock-based Agriculture

The overall objective of this Institutional Project is to provide stakeholders in the livestock-based agriculture with information that can be used to define appropriate policies, develop suitable technologies, and facilitate transfer to the users. This includes the socio-economic characterization and profitability studies of livestock enterprises and intervention schemes.

No research activity was undertaken under this institutional project during the period under review.

### IP10: Training, Capacity Building and Information Exchange

Training, capacity building and information exchange activities were also pursued in 2010. The table below shows the details of the completed and ongoing trainings. The Regional Expert on Capacity Building and Institutional Development of PROGEBE initiated some institutional developments at ITC, and coordinated the capacity building activities of the Regional PROGEBE Project.

Staff Name	Training Title	Institution	Status
Modou Gaye Livestock assistant	BSc Agriculture	University of The Gambia	Ongoing
Anani A Bankole Research associate	PhD Medical science	University of Antwerp, Belgium	Completed in July 2010
Michel Dione Research associate	PhD Medical science	University of Antwerp, Belgium	Completed in July 2010
Arss Secka Research associate	PhD Medical science	University of Antwerp, Belgium	Completed in October 2010