



**MISSION REPORT ON EDITING AND PUBLISHING REPORTS ON THE PAN-
AFRICAN PROGRAMME FOR THE CONTROL OF EPIZOOTICS**

BOOKLET ON PACE SUCCESS STORIES

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1.0. Presentation of the PACE Programme

1.1. Introduction and Background of the PACE Programme

When Rinderpest was introduced to Africa in the late 19th Century, the pandemic killed up to 90% of cattle and other susceptible wildlife species. The disease has plagued the African continent since then due to the presence of large numbers of domestic and wild animals, the inadequacy of veterinary services, nomadic husbandry practices and insecurity. Concerted action to eradicate the disease, commencing with the "Joint Project 15", implemented by the Organization of African Unity/Interafrican Bureau for Animal Resources (OAU/IBAR) in the 1960s and 1970s followed by the Pan African Rinderpest Campaign (PARC) in the mid 1980s and the Pan African Control of Epizootics (PACE) in the late 1990s, succeeded in eradicating Rinderpest from most of Africa with the exception of the so called mild strain of the virus in the "Somali Eco-system", an area of land that encompass South East Ethiopia, North East Kenya and Southern Somalia.

The PACE Programme, which is in its final phase (November 1999 to February 2007) was conceptualized to build on the headway made by the Pan African Rinderpest Eradication Programme (PARC) (1986 to 1999) in the campaign against Rinderpest. The PARC has lasted from 1986 to 1999 and has been co-financed by the European Community (EC). PARC has been a follow up of the Joint project 15 (JP15) (1962 to 1976) also aimed at fighting the Rinderpest in Africa. All these actions have already done a great deal to improve health security by combating Rinderpest, one of the most devastating contagious diseases of cattle.

Taking advantage of PARC's achievements, a fundamental objective of PACE was to continue the establishment of effective surveillance systems for animal diseases in 30 countries involved in the programme. Such surveillance is essential for an effective veterinary service in any country as is indicated by the requirement for adequate disease reporting (OIE, 2002). Thus without effective surveillance for important animal diseases, particularly those that affect trade in livestock and livestock products, human health or the economics of animal production, a veterinary service will not be considered reliable. Increasingly, the World Organization of Animal Health (OIE) provided a mechanism whereby member countries may apply for recognition of freedom from specific diseases, such as Rinderpest, foot and mouth disease (FMD), contagious bovine pleuro-pneumonia (CBPP) and bovine spongiform encephalopathy (BSE). In order to apply successfully it is necessary for the country concerned to demonstrate, irrespective of the requirement for individual diseases, that it has an effective veterinary service which, as already indicated, includes an effective surveillance system. Consequently, all applications for freedom from disease need to be supported by surveillance data. For this reason, in the context of globalisation the establishment of surveillance system has become a priority for veterinary services in countries, which would like to take part in the international trade of livestock and animal by-products.

In particular, Rinderpest eradication is a global objective and the African Union / Inter African Bureau for Animal Resources (AU / IBAR), through the Pan African Programme for the Control of Epizootics (PACE) has been for 7 years spearheading its eradication in the African continent.

1.2. Inputs and Objectives of the PACE Programme

1.2.1. *The Objectives of the PACE Programme*

The PACE programme has been designed to meet beneficiaries' requirements, country needs and global priorities in terms of control of Rinderpest and other major epizootic diseases of livestock. This has been implemented by inputs to meet the following objectives:

- developing disease surveillance
- developing animal health information systems
- continuing with Rinderpest eradication
- strengthening of control of other major animal epizootic diseases

The PACE Programme has established the PACE Epidemiology Unit (PEU) and Data Management Unit (DMU) for implementation of disease surveillance and information system components, through the following objectives:

- To enhance national capacities in the delivery of epidemiological services
- To Facilitate the eradication of Rinderpest from Africa by assisting in the elimination of the virus from the remaining foci of infection and verification that eradication has been achieved
- To assistance to member countries in the control of other major epizootic diseases
- To support the privatisation of national veterinary services with amendments to national legislation where appropriate
- To increase livestock farmers' awareness of the benefits of animal health services and strengthening linkages between central institutions and livestock farmers

1.2.2. *Design and planning of PACE components*

Training

Planning and implementation of training interventions was carried out by individual components of PACE at Central, Regional and National levels.

Privatisation and Legislation

The strategy to promote privatisation in the delivery of veterinary services included two main elements:

- Updating veterinary legislation in PACE countries so that there is a framework for privatised veterinary services.
- Provision of relevant training of private veterinary service providers.

This was done by two main components, namely:

- The VLPU, which provided technical assistance to PACE countries to modernize their veterinary legislation
- The CAPE project, which focused on the promotion of the use of Community-based Animal Health Workers (CAHWs)

In addition, national PACE privatisation units were involved in promoting the privatisation of veterinary services within their own countries. In the case of CAPE, much of the

implementation was done through NGOs working in conflict areas and remote ASAL regions where conventional veterinary services are not available.

Although not a planned component, in some countries PACE continued to administer a scheme set up under PARC to provide guarantee funds against bank loans and credit to private veterinarians.

Expanding awareness of animal health services and benefits and improving linkages between central institutions and livestock farmers

In order to achieve these objectives, the Communication TAs in Nairobi and Bamako visited all the PACE countries to advise and train locally appointed national PACE Communication officers on how to strengthen their farmer awareness programmes. This included advice on how to strengthen linkages between central institutions (usually Government Veterinary Services) and livestock farmers. Implementation of these recommendations and advice was the responsibility of the local National PACE Communication Officers under the direction of National PACE co-ordinators.

Laboratory diagnostic services

As part of PACE's objectives to eradicate Rinderpest and strengthen surveillance of other major epizootic diseases, national central and district veterinary laboratories were strengthened by training of staff and provision of laboratory equipment and consumables. Three of the National Central Veterinary Laboratories (KARI, Muguga; LNERV/ISRA Dakar and LANADA, Bingerville) were designated as Regional Rinderpest and PPR Reference laboratories. A laboratory expert seconded by the International Atomic Energy Agency (IAEA) provided technical assistance from 2001 to March 2006.

2.0. PACE Achievements

2.1. Epidemiological surveillance

Epidemiological surveillance is defined as a system based on systematic and continuous collection, analysis and interpretation of animal disease (or infection) data, allowing the health status and associated factors of given populations to be followed in space and time for use in the planning, implementation and evaluation of disease control measures. It should satisfy the information requirements of accurate disease reporting, risk analysis and determination of animal health status, both for international trade as well as for internal decision-making. Surveillance data underpin the quality of disease reporting and provides the basis for accurate risk analysis. Such data are also essential to support claims for a particular disease/infection status.

2.1.1. Disease surveillance systems and networks

Since the beginning of the activities of PACE Programme, 100% of member countries have established or revitalized their national ESS and to date all diseases surveillance systems are operational excepted in Equatorial Guinea. In general, the surveillance systems set up have a good organization resting on supervision bodies (steering committee and technical committee), a central unit and the actual field network composed of livestock agents working under the supervision of heads of departmental and regional services. When this whole arrangement is placed under the supervision of the Directorate of Veterinary Services, one can consider that there is a genuine line of command facilitating the flow of animal health information. But this is not always the case, as in certain countries, the field agents are working under regional directorates that report to the Ministry of Agriculture. With this configuration, this creates command problems when implementing actions, mostly when handling rapid outbreak interventions. It must also be pointed out that the organization of surveillance systems is formalized in many cases by regulatory texts (ministerial order, for example).

Taking into consideration the various **wildlife populations** in Africa, **wildlife disease surveillance** has been addressed. The Wildlife epidemio-surveillance is a new field of activities launched by PACE Programme in Africa. That why, it was necessary to precise the concept before bringing it to the field. This was done through training workshops mainly on wildlife epidemio-surveillance but also on wildlife game captures techniques. Efficient wildlife epidemio-surveillance could only be done through consolidation of regional teams and working at an ecosystem level, pooling resources and sharing data of a transboundary nature. This has both scientific and practical benefits and had facilitated the preparation of OIE pathway dossiers for applications on freedom from diseases and therefore for infections.

PACE programme has contributed to improving the equipment of agents by funding the acquisition of vehicles, motorcycles, cold chain material, laboratory equipment and various other equipments. The delays noted in the acquisition of equipments because of a lack of familiarity with the managing procedures of EDF projects have gradually been curbed. Some countries have also received equipment through other projects that have generally improved the operationally of veterinary services. However, there are problems in covering recurrent costs (fuel, maintenance) for vehicles as well as motorcycles.

There are improvements noted in the flow of animal health information between the field and the central veterinary administration and from the latter to the laboratories. The reporting uses forms in line with the OIE requirements and is managed in a centralized computerized system based on the ARIS software (Animal Resource Information System), developed by the PACE programme. Apart from the traditional data transmission channels (monthly reports, warning bulletin), certain countries have set up an inter-connected network which makes possible instant flow of recorded information. The PCU encourages countries to go in this direction by fostering the funding of this type of investment during the last year of the PACE programme. There are still reporting problems however, particularly in those countries where the command line no longer exists.

In order to optimise network operation, the PACE programme has promoted the introduction of performance indicators (PI), which are qualitative tools for steering and verifying the adequate functioning of networks. Performance indicators are defined as a limited number of variables, gathered on a control board, which help continually assess the level of realization of priority activities of the network in order to facilitate steering. A regional network was organized by the PACE programme in August 2004 in Dakar (Senegal) to train epidemiologists on the use of these tools. The PACE epidemiology unit has published a guide for the development of performance indicators for evaluating epidemio-surveillance networks in two languages, English and French. This guide provide the central veterinary authority of a country with a mechanism to assure itself of the effectiveness of the ESS. The aim of this document is to provide guidance to enable countries to develop their own indicators for evaluation of the capacity and functionality of the ESS. These guidelines are generic to ESS and do not address Rinderpest (RP) surveillance specifically.

In an effort to make the surveillance systems more sustainable and provide an incentive to improve and adapt existing surveillance systems the PEU developed ideas, which would increase the justification of ESS. The PACE Coordination Unit and AU-IBAR strive to help officials of veterinary services sensitize national decision makers on the interest and the economic benefits for countries to further invest in a sustainable manner in animal health in general and animal disease epidemiological surveillance in particular. To achieve this, they put at their disposal any relevant information which could serve as selling point for total ownership of epidemiological surveillance activities at the end of the program.

2.1.2. Cost-benefice analyses of ESN and appropriate actions against diseases

One must keep in mind that the two fundamental objectives in terms of animal health economics are: maximize the financial impact of the control or preventive method chosen (vaccination system, surveillance system), on the one hand, and minimize their financial costs, on the other hand. Any presence of a disease at a given prevalence (percentage of animals affected) corresponds to direct and indirect costs which may be converted into losses and which can be avoided, with more or less success, thanks to epidemio-surveillance. The efficiency of epidemiological surveillance applied to a disease and for a given species may be classically appreciated from direct or indirect losses avoided thanks to that surveillance.

Studies conducted by the PACE programme (1999-2006) showed that epidemio-surveillance system is essential for developing a cost-effective animal disease eradication program. A good epidemio-surveillance system can provide such information and make it possible to plan a selective low-cost intervention as opposed to a blind intervention using mass

vaccination. Several of those PACE studies have clearly shown that investment in animal disease control is beneficial both from an economic and social standpoint. For example, for each € invested in Rinderpest control in ten (10) African countries considered in a study, there is a return of €1.83 and a net present value € 29.0 million. Similarly, investment in CBPP control in twelve (12) countries considered yields a return of € 1.95 and a net benefit of € 11.8 million.

According to all the studies conducted, there is no doubt that appropriate control of animal diseases and in particular an effective veterinary epidemiological surveillance, covering all really priority diseases (from an economic standpoint) is very beneficial for the countries, for their populations and for their public expenditures. When one adds to this equation the possibilities or opportunities of exporting livestock products (thanks to a better health status, recognized by the international community), or the impact of certain diseases on public health (rabies, brucellosis, tuberculosis, Rift Valley Fever), the return or benefit/cost ratio becomes even more positive, since there will be social and humanitarian considerations in addition to the economic considerations.

2.2. Capacity building

2.2.1. Technical and managerial capacity building

2.2.1.1. Technical and managerial capacity building at Institutional level (AU-IBAR/PCU)

The AU encourages IBAR to take a pro-active role in defining the possible future of the institution. As part of its contribution to the institutional development of IBAR, PACE and CAPE made available resources to access external and mutually acceptable expertise to assist with the exercise of preparing a strategy paper on the possible direction for IBAR's institutional development.

The Finance Agreement signed in 1999 with the EC included indicators at the level of its' specific objectives putting an emphasis for the PACE programme to achieve an increased capacity and a 'safeguarding of animal health against list A diseases'. Delivery and access to veterinary services is not explicitly mentioned at the level of specific objectives but it is assumed to be part of capacity building.

Increased capacity is specified to include technical and economic assessment of diseases and generation of control programs, both for the programme as a whole and for the national programmes. To address the programme as a whole in this part of this document, since the PCU was in charge of assisting each country, it is important to notice that much capacity building effort has gone into strengthening of surveillance networks. Effectiveness of these networks is primarily measured by 'functionality' and performance indicators such as timely receipt of disease information, time needed to analyse samples and existence of emergency plans. Expressed in these terms, functionality has improved in most of the countries.

It is also relevant to mention that in the first few three years or so of PACE, considerable effort was put into institutional communication even if this effort has been greatly reduced those last years, close to the end of the programme. The following outputs have been produced:

- CD ROMs on Epidemio-surveillance and Rinderpest.
- Pan-African Animal Health Year Books (2003 and 2004) produced and distributed.

- Setting up of the PACE website.
- A PACE Video documentary produced and distributed to national co-ordinators.
- PACE Press kit.
- Assistance to other projects within IBAR to produce outreach materials, e.g. FITCA, CAPE and IBAR itself.
- Video on livestock producers' views produced with CAPE.

2.2.1.2. Technical and managerial capacity building at regional level

At the regional levels and more importantly at the Regional Coordination for West and Central Africa located in Bamako because the Regional Coordination for East Africa remained together with the overall Coordination Unit in Nairobi, PACE has also done a lot in technical and managerial building.

In July 2003, a MOU was signed between AU and Ethiopia transferring responsibility of PANVAC to AU. Then, the PACE Laboratory Expert was recruited to become Director of PANVAC working under the Director of IBAR. Despite some problems over funding, by the 12th AC meeting in April 2006, the AC reported that PANVAC was now operating effectively with a substantive Director and budgetary provisions. Thus this process appears to have been carried out very efficiently, and PACE has contributed very significantly to the revitalisation of PANVAC.

With the cessation of Rinderpest vaccination throughout the PACE countries, PACE has established a Rinderpest vaccine bank as a precaution against a re-emergence of the disease since it has been observed that cattle populations become increasingly susceptible to infection. A stock of 500,000 doses has been placed at the Botswana Vaccine Institute which takes care of its storage and quality assurance.

Furthermore, PACE funded a bank of Rinderpest vaccine in Lokichoggio in N.W. Kenya and in Khartoum (Sudan) in the final stages of the Rinderpest campaign in Southern Sudan. These PACE contributions to emergency preparedness against Rinderpest appear to have been implemented efficiently, although care is required to ensure that the vaccine bank is replenished when vaccine stocks expire as was noted in the PACE annual report of June 2002 to May 2003.

In April 2006, the 12th ACM recommended that Euro 350,000 be allocated for the purchase of HPAI vaccine. This recommendation was subsequently approved by the EC and the HPAI vaccine bank will be managed by the OIE.

2.2.1.1. Technical and managerial capacity building at national level

At countries' levels, PACE has worked at some extent in developing the private veterinary and animal health sector. The second result in the PACE Logical Framework was "Greater privatisation of veterinary services and public/private sector linkage in this field". To support the legal status of privatised veterinary services, one of the activities is the "harmonisation of legislative positions on the veterinary profession and veterinary drugs". These activities were refined in the extension phase with the following activities:

- Development of national guidelines for CAHW systems, legislative reform, development of licensing procedures for CAHW trainers and trainees, development of agreements with implementing agencies to ensure harmonised approaches and private sector involvement.

- Provide technical support to DVS and statutory bodies to strengthen their capacity to co-ordinate, regulate and supervise para-veterinary professional systems in accordance with OIE guidelines.

It has also been clear from the Country visits during the Final Evaluation Mission that many communication activities have been carried out by the National PACE Communication units, albeit of variable quality from country to country. From interviews with farmers, the Mission was satisfied that the farmers had a good awareness of the importance of veterinary services available to them and their benefits, and also the importance of disease surveillance. A significant and useful output of the National Communication officers in collaboration with their epidemiology colleagues has been the publication of regular bulletins of the national epidemiology-surveillance networks. Unfortunately, the documentation and archiving of this material has been poor, and the sharing of best practice between PACE countries in this respect has not been sufficient otherwise it is concluded that the overall efficiency of PACE's contribution to developing National Communication programmes has been satisfactory.

2.2.2. Training

A major aspect of the PACE programme has been training at all levels from livestock farmers to senior professional veterinary staff. There have been many training interventions throughout the PACE programme. Assessing the training programme as a whole has posed certain difficulties because there was no single unit with responsibility for planning and co-ordination of training activities, and training interventions have been carried out within individual technical components. The trainings which took place have covered the following aspects:

- *Epidemio-surveillance*
- *Wildlife surveillance*
- *Communication*
- *Animal Health Economics*
- *Zoo-sanitary Data Management*
- *Privatization of Veterinary Services Delivery*
- *Risk assessment training for national epidemiologists.*

There is no doubt that the extensive training at all levels by PACE has impacted significantly on the project's progress. However, greater attention should have been paid to assessing training needs and devising a training strategy early in the project to ensure that all training requirements were covered. Had this been carried out, the weakness of training of national co-ordinators in management and EDF procedures in some cases might have been avoided. In addition, the lack of training in animal health economics was noted in the PACE Annual Report of June 2002 – May 2003, although this was addressed to some extent by two workshops in Sudan 2003 and Addis Ababa 2004.

At livestock farmer level, the overall strategy has been to train field veterinary staff to transfer information to livestock farmers on a range of disease issues. The strategy has been generally satisfactory, but it is apparent that the effectiveness of this training is variable from country to country. For example, farmers in Sikasso Region in Mali stated that training had reached only 50% of livestock farmers. By contrast, representatives of farmers' associations in Mamou in Guinea expressed satisfaction with the level of outreach to the livestock farmer members of their associations.

The technical knowledge of veterinary personnel, both public and private, is generally satisfactory and the PACE training programme has contributed to this. The greatest weakness in technical training and support has been in the software usage for the disease information systems. For example all information data that had been entered into the ARIS software in Mali has been lost and is having to be re-entered from original hard copies. Similarly the officer in Burkina Faso expressed having difficulties in using the ARIS software.

2.2.3. Support to laboratories

The collaboration between AU-IBAR and the IAEA (International Atomic Energy Agency) which started during PARC continued under PACE by the appointment of a laboratory expert from IAEA in June 2001. Over the next 4 years the expert was extremely active in strengthening the laboratory diagnostic capacity within PACE countries by training and supervision of the provision of equipment and diagnostic reagents. The first year focussed in assessing the diagnostic capacity of national veterinary laboratories in PACE countries and assisting them with their work-plans. National PACE co-ordinators have involved their national laboratory personnel in drawing up their budgets for laboratory equipment and consumables. Consideration was also given to the designation of Regional Reference Laboratories. The laboratory expert collaborated closely with the Epidemiology Units to strengthen the diagnostic capacities needed for Rinderpest eradication and in support of the surveillance networks.

A major input was the designation of three Regional Reference Laboratories to carry out Rinderpest diagnosis by serology, PCR, molecular characterisation and virus isolation. The Regional Laboratories are as follows: KARI (in Muguga, Kenya), ISRA (in Dakar, Senegal), and LANADA (in Bingerville, Côte d'Ivoire).

All the PACE countries have a veterinary laboratory functioned and equipped (at different levels) for the diagnosis of Rinderpest with the exception of Burundi, CAR, Congo, Equatorial Guinea, Gabon, Rwanda and Somalia. By the end of 2005, it was reported that the national veterinary diagnostic laboratories had received diagnostic equipment and their staff trained or retrained. In general staff from the National laboratories of Guinea, Dakar, Burkina Faso, Mauritania, Mali, Kenya Rwanda, Tanzania and Uganda plus the Tenkodogo district laboratory in Burkina Faso visited during the final evaluation of the programme are motivated and have benefited from training and provision of equipment and consumables under PACE. Because laboratory diagnoses are an essential component of disease surveillance, it was observed with concern that there is serious underutilisation of the diagnostic capacities of the laboratories in West Africa.

2.2.4. Establishment of an emergency fund

PACE has established an emergency fund entrusted to the OIE through a convention signed in July 2001 between the AU-IBAR and the OIE. The fund was initially for Euro 2,000,000, but later reduced to Euro 500,000 in association with the preparation of the budget for the extension phase of PACE. This fund is for the rapid mobilization of essential resources in the event of reintroduction of Rinderpest virus to a fully susceptible cattle population, and its use would be subject to conditions that the country (ies) concerned set up a clearly defined emergency (intervention) plan against Rinderpest.

2.2.5. Support to veterinary schools and faculties

The Communication Unit held meetings with the Deans of Veterinary Schools in Uganda and Senegal with a view to introducing training on communication into the curriculum. As a result the Communication Unit sponsored a pilot module on Communication training in the 4th Year of the Veterinary curriculum at the École Inter-Etats des Sciences et Médecine Vétérinaires (EISMV) in Dakar. However this did not become a permanent part of the curriculum. In fact the curriculum had already been modified in 1999 to include training in rural economics. This stemmed from the early 1990s when, because of the moratorium on recruitment into the public sector, it was recognised that training for private vets was needed. Thus it means that when students graduate they have some training in economics in preparation for working in the private sector.

In addition, the association of Deans of Veterinary Schools has now been established in order to undertake the curricula review in line with the current development and changes in the livestock sector.

Despite these developments, the AC recommended that further inputs into veterinary education institutes should not be pursued. Nevertheless, there was a further meeting in Addis Ababa in March 2004 of PACE with Deans and Directors of Veterinary Schools and Faculties in which there was an exchange of views and information. In addition PACE has been supporting Continual Professional Development (CPD) training by the EISMV of private vets on business management e.g. by funding of workshops etc.

2.2.6. Support to the OIE regional office for Africa

The PACE programme provided financial support to the Africa Representation of the OIE (World Animal Health Organization). An agreement has been established in that sense since programme start-up in November 2000. The budget of the OIE Regional Representation which was included in that of the PACE Regional Coordination programme for West and Central Africa in the first two years has become autonomous later on. The Regional OIE Representation shares the same premises as the PACE Regional Coordination in Bamako.

2.3. Achievements in the Control of Rinderpest, CBPP, and Other Epizootics

2.3.1. Eradication of Rinderpest in Africa

The eradication of Rinderpest constitutes a major objective of the PACE, as had been the case for the two preceding projects, JC-15 : Joint Project 15 (1962-1976) and the PARC, the Pan-African Rinderpest Campaign (1986-1999). The control of Rinderpest on the African continent also fits into the world-wide objectives of the Global Rinderpest Eradication Program (GREP) coordinated by FAO and which aims at the world-wide eradication of Rinderpest by the year 2010.

Although the effects of JC-15 had been annihilated for the most part by the renewed outbreak of Rinderpest on the African continent, it must be recognized that since the PARC programme, major progress has been made that the PACE programme has strived to consolidate. Nowadays, clinical Rinderpest has virtually disappeared from the African continent and vaccination campaigns are rare. The only region of Africa (and probably of the world) supposed to still host the Rinderpest virus in a hypo-virulent form (i.e., with few symptoms and few casualties) is that of the Somali ecosystem in the horn of Africa.

90% of PACE participant countries have entered the OIE pathway by declaring their territory or part of their territory provisionally free of Rinderpest. Since May 2005, 16 countries have been declared free of the disease and 4 are recognized free of infection. 86% of the countries have developed their emergency plan and have submitted it to the AU-IBAR which has already approved 69.2% of those.

In Western and Central Africa, 12 countries (including one on a zonal basis) have been recognized as free of Rinderpest (disease) by the OIE (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Guinea, Mali, Mauritania, Niger, Nigeria, Senegal, Chad, and Togo). Three countries have been declared free of infection since May 2005 (Benin, Senegal, and Togo).

In Eastern Africa, 4 countries (including 2 on a zonal basis) are recognized as free of the disease (Eritrea, Ethiopia, Tanzania, and Sudan). Only Eritrea has gained the status of infection free country as of May 2005. In May 2006, 6 countries recognized free of the disease should gain the status of infection free countries. This also holds true for countries such as Burundi, Congo, Gambia, Guinea Bissau, Equatorial Guinea, and Rwanda, which can directly claim infection free status based on historical absence of the disease.

It must be pointed out that upon AU-IBAR's request, the epidemiologists of the PACE program bring some support to African states which are not members of the PACE program in the preparation of their dossier to be submitted to the OIE.

As for the Somali ecosystem, this region includes North-eastern Kenya, Southern Somalia, and Region V of Ethiopia, a particular strategy has been developed for the region and a Somali Ecosystem Rinderpest Eradication Coordination Unit (SECECU) under AU-IBAR supervision will coordinate its implementation. The unit, which comprises all actors/stakeholders in the area (national veterinary services, projects, NGOs and representatives of interested international organizations) will aid in strengthening the coordination of activities based on a joint intervention strategy. The European Union has funded a new animal health development project in Somalia whose objectives are in line with those of PACE.

Wildlife surveillance has continued normally in East Africa; as far as West and Central African countries are concerned, it has been agreed with the countries, because of the low animal population density, to adopt an ecosystem based approach and to set up a regional team. A training programme was implemented to that effect in Ghana in July 2005.

2.3.2. Control of CBPP

Based on a regional approach, and taking into account the epidemiological situation, transboundary systems and socio economic conditions, a strategy for CBPP control has been developed by the PEU and adopted by some countries. The epidemio-surveillance systems, improved diagnostics, communication programmes and economic studies introduced by PACE have improved awareness of CBPP and knowledge of its prevalence and impact.

Few countries, however, have taken up systematically the CBPP control programme recommended by the PEU and CBPP continued to be a major problem e.g. in Mauritania despite a compensation system farmers continue to be suspicious about CBPP vaccination and only 19% of the national cattle herd was vaccinated in the most recent campaign. Exceptions in West Africa are:

- Senegal, where vaccination stopped in 2005 and the last outbreak of CBPP was in 1977. Risk of re-entry of CBPP is from Mali and Mauritania, and Senegal is in the process of signing a zoo-sanitary agreement with these countries to control livestock movements. CBPP surveillance will continue with herd surveillance and in 30 abattoirs and slaughter points. Senegal is declaring itself to OIE to be provisionally free from CBPP in order to proceed along the OIE Pathway.
- Guinea, where the country has been divided into four epidemiological zones as follows:
 - Disease free zone - no vaccination.
 - Disease free zone but under surveillance - vaccination stopped 4 years ago.
 - Buffer zone (combination of surveillance, annual vaccination and stamping out of clinical cases with two rounds of ring vaccination).
 - Endemic zone (annual vaccination without sero-surveillance but stamping out of clinical cases).

These measures are in line with OIE guidelines.

In East Africa, Tanzania has good surveillance for CBPP, including abattoir surveillance, and is pursuing annual vaccination against CBPP on a zonal basis. In Uganda, there is also good surveillance, and there are follow-up vaccination campaigns, with cost recovery, where the disease is diagnosed or there is trace-back from an abattoir. In Kenya, a zonal policy has been adopted for CBPP control:

- Disease free zone without vaccination and slaughter of clinical cases.
- Surveillance zone without vaccination.
- Buffer zone and infected zones where free vaccinations of T₁₄₄ are given bi-annually.

Ethiopia has appointed an epidemiologist supported by PACE to implement CBPP surveillance and control.

CBPP has only recently been introduced to Eritrea through cattle imported from Ethiopia. A control programme has been formulated in collaboration with FAO and PACE, and support for it has been gained from Government for its implementation. A workshop on CBPP has been undertaken and staff are ready to commence a control programme, but its planned implementation through PACE has not happened because of lack of approval of the work plan.

While it has taken small advantage of the PACE programme, Rwanda has implemented a highly successful CBPP control programme in which the entire cattle population was vaccinated five times in three years with T₁₄₄ vaccine. Rwanda has the advantage of having a small, mainly sedentary, cattle population with a good road network. Nevertheless it has succeeded in eliminating CBPP and is safeguarding its CBPP-free status through stringent movement control, particularly of imported cattle.

2.3.3. Control of HPAI

In the last year of the extension phase of the PACE programme, outbreaks of Highly Pathogenic Avian Influenza (HPAI) had a major impact on project activities, particularly on those of the PEU and the Technical Assistants. Since the beginning of 2006, HPAI has been diagnosed in seven PACE countries, out of 8 affected in Africa. Highly Pathogenic Avian Influenza (HPAI), caused by avian influenza virus subtype H5N1, has severely affected poultry production in Southeast Asia since 2003. The African continent recorded its first outbreak of HPAI in Nigeria in February 8, 2006 in domestic poultry. Since then Egypt, Niger, Cameroon, Burkina Faso, Sudan, Côte d'Ivoire and Djibouti, have reported outbreaks of the disease in domestic poultry. The threat of further spread in Africa is real and it could occur from the legal or illegal movement of poultry and/or poultry products, or potential interaction between domestic poultry with infected wild bird populations.

Taking into consideration that the mechanism of a rapid and vast dissemination of the disease both nationally and internationally is not yet understood, and after analysing the threat to Africa from this disease and its impact on efforts towards poverty alleviation in the continent, AU-IBAR as the technical office of the African union mandated to address all animal health issues has taken the lead in preparing the continent against HPAI. Control measures in PACE countries have been enhanced by the epidemio-surveillance and sampling procedures which the project has introduced and which has been extended to domestic and wild birds. It would not have been possible to deliver the surveillance and control measures for HPAI in the countries affected if the passive and active epidemio-surveillance systems already developed through PACE had not been in place.

Since the beginning of HPAI epidemics in PACE countries there have been the following developments:

- Bans on imports of poultry and poultry products from infected countries have been introduced.
- Emergency preparedness plans have been elaborated.
- Surveillance in domestic and wild birds is ongoing.
- Memoranda of Understanding have been made between AU-IBAR and ADB so that funds for control of HPAI are available for eight countries in West and Central Africa.

Priority actions planned within the framework of emergency plans by countries should focus

capacity building in the area of early diagnosis with a view of accelerating the implementation of control measures, and increase the rapid response capacities in case of outbreaks.

2.3.4. Control of other diseases

The African swine fever (ASF)

Control or eradication of ASF is hampered by the lack of an effective vaccine against ASF. The other problem with the control of ASF in Africa is that in most regions where the disease is currently a problem, effective movement control in respect of pigs and pork is very difficult, if not impossible, to achieve. Traditional pig-keeping in Africa is perceived as an important constraint for the control of African swine fever (ASF). Free-ranging, scavenging pigs are at greater risk of infection for various reasons. In areas where the sylvatic cycle of ASF occurs between argasid ticks and warthogs (and possibly other wild suids), the risk of contact with the natural vectors of the virus is increased. The combination of these two factors renders effective management of ASF extremely problematic.

The PEU, has recognized that African Swine Fever (ASF) is an important transboundary disease, particularly in Western Africa because the countries of this region are afflicted by a common problem that circulates among them. Any country in the region that fails to control ASF effectively exposes pork producers in the country concerned to unacceptable financial risk and also provides a source of infection for neighbouring countries.

A strategic document has been prepared by the PEU in collaboration with a FAO consultant. The proposed strategy document underlined the following activities that could be considered to assist with the future control/eradication of ASF in western Africa.

Pig production

Free-range pig production systems are incompatible with effective ASF control in western Africa. Therefore, one way of limiting the effect of this disease in the region would be development of regional and national programmes that encourage commercialisation of production within enclosed systems. Once pigs are confined on a continuous basis, control of ASF becomes relatively simple.

Short-term measures to improve surveillance and control

In the coastal countries of West/Central Africa that are currently free of the disease, rapid detection of ASF when it occurs needs to be the cornerstone of any strategy against the disease. This is vital because all these countries are at high risk of having the infection introduced across their borders from infected countries in the region. Rapid detection is dependent upon:

- an effective epidemio-surveillance system or network;
- a competent diagnostic laboratory;
- co-operation of the pig farmers/owners.

These aspects are part of the current PACE Programme, supported by the IAEA for the laboratory component. All countries have been provided with finance to affect the first two measures (in some cases with inputs provided by the FAO).

If ASF is detected soon after introduction, it should be possible for the infection to be “stamped out” because the number of animals involved would be small. Conversely, once the infection has spread, “stamping out” becomes difficult and, usually, unaffordable.

Epidemiological investigations

There are two obvious lines of investigation that are likely to bear fruit, *viz.* (i) basic studies into the transmission parameters of the infection where domestic pigs are involved and (ii) those aimed at understanding how the infection remains endemic in specific localities in Africa. These localities include adjacent areas of Malawi, Mozambique and eastern Zambia, Angola, parts of Uganda and DRC, and adjacent areas of Senegal and Guinea Bissau.

The Rift Valley Fever (RVF)

Rift Valley fever (RVF) remains an impediment to livestock exports from the Horn of Africa to the Arabian Peninsula but AU-IBAR and a number of international and regional organizations have developed initiatives to address the problem. PACE has conducted a regional workshop on Rift Valley fever (RVF) and the PEU has assisted the OIE to redraft the OIE Terrestrial Animal Health Code to redefine circumstances under which trade in animal commodities can be sourced safely from “non-free areas”. The revised chapter also permits the use of vaccine to protect animals intended for trade as long as it is not administered within three weeks of the animals being slaughtered. Revision of the chapter should assist PACE countries in the Horn of Africa to resume their livestock export trade.

Foot-and-Mouth-Disease (FMD)

In Eastern and Western Africa it is clear from information gathered by the PEU in PACE countries that FMD is a growing problem for both livestock producers on the ground (even in some extensive systems) and for trade. Still according to PEU, the disease seems to be escalating in Eastern Africa. PACE has increased awareness of the disease through the epidemio-surveillance system and introduction of diagnostic tests in national laboratories to diagnose and serotype FMD outbreaks. However, there is concern and lack of understanding about the role of wildlife in propagating outbreaks in cattle. PACE has helped by sending wildlife sera for FMD serology to Pirbright IAH for testing. The results should help to map the likely serotype distribution in wildlife in the East, West and Central African region and to be associated with known cattle sero-types. This can assist countries in development of their FMD control strategy.

The PEU has instigated investigations of FMD outbreaks, particularly in Sudan, where sero-types A, O, C, SAT1 and SAT2 were found to be prevalent.

According to the Minutes of the 24th Livestock Co-ordination Meeting held in Lokichoggio, October 2003, in the last 5 years 45 different outbreaks were recorded in southern Sudan. In 9 of these outbreaks the virus involved is recorded as having been identified. This data shows that sero-types A, O, C, SAT1 & SAT2 are prevalent in the region. However, it seems that this information is based largely on serology that is unreliable for establishing prevalence of viral types where two or more occur together in a locality and the data should therefore be interpreted with caution. Nevertheless, these are the same sero-types prevalent in other regions of Eastern Africa where findings of the PEU have recently shown that FMD is an escalating problem. Therefore, the situation current in southern Sudan seems to be part of a clear trend in Eastern Africa. Therefore, the PEU identified that a regional counter-strategy

2.3.5. Achievements in research on animal epizootics

The Financing Agreement of the PACE programme stipulated that the FAO World Reference Laboratory for Rinderpest based at the Institute for Animal Health, Pirbright (in the UK) would co-ordinate the research programme for Rinderpest and PPR. Since the PACE program was based on capacity building and sustainability, it was felt that wherever possible the research should be carried in laboratories to be identified in Africa. However, due to the lack of facilities in many African Laboratories some of the work had taken place in Reference Laboratories such as IAH, Pirbright or CIRAD EMVT, Montpellier. The final stages of validation and adaptation to local conditions have taken place in African Laboratories whenever possible. The advantages of this approach has been to strengthen the collaborative links and technology transfer between the reference laboratories and the regions where Rinderpest and CBPP are still of concern.

To strengthen the success of the Pan-African Rinderpest Campaign (PARC), and achieve the complete elimination of the Rinderpest virus from the continent and control of CBPP, the following identified research needs have been conducted:

- ✓ The use of PPR vaccine to protect ruminants against Rinderpest,
- ✓ The study of cellular immune response induced by Rinderpest and PPR,
- ✓ The study of Rinderpest mild strain in cattle, sheep and goats,
- ✓ The validation of pen-side test,
- ✓ Bacterial, immunological, chemotherapeutic studies on CBPP.

On the advice of the Advisory Committee, the PCU contracted the National Veterinary Research Institute, Muguga to undertake a study of PPR vaccine to ascertain whether its use in cattle would provide cross protection against Rinderpest without interference with serological tests for Rinderpest antibody used to detect previous infection with wild Rinderpest virus. This work would validate the efficacy and safety of PPR vaccine if it becomes necessary to use vaccination in the Somali Ecosystem in the face of an outbreak of Rinderpest Lineage 2 in its last stronghold. The results of the trial were not able to demonstrate significant protection of cattle against Rinderpest by the PPR vaccine.

Research activities were also performed to develop marked Rinderpest vaccines and improved serological tests for Rinderpest.

The research on the development and validation of improved serological tests for Rinderpest virus to differentiate the serological responses to different Rinderpest virus lineages has given the following results:

The use of peptides to distinguish different lineages was explored. For this, the hypervariable C-terminus of the N gene was sequenced from 15 different strains of Rinderpest virus which included several representatives from each lineage.

The predicted amino acid sequence derived from nucleotide sequence data was used to design regions that contain residues that are unique to each lineage and could therefore be used as potentially lineage specific antigen. A series of peptides were then generated but initial trials with these peptides in ELISA gave problems. It was very difficult to completely solubilise several of the peptides which meant that a precise quantitation of the concentration of the peptides was not possible. This in turn made it very difficult to carry out a truly comparative study of these peptides as one

could never be sure of the exact amount of peptide present in each well of the ELISA plate. Unfortunately none of the peptides designed from vaccine sequence responded specifically to vaccine sera in these preliminary trials.

It was then decided to express a longer region of the hypervariable region for each lineage in a bacterial expression to see if they could distinguish between the vaccine and each of the lineages. The work to produce the expressed proteins was completed but as the second instalment of money has not been paid, pending submission of proper financial accounts, there was no means to employ a person to complete the work.

The trials of the Rinderpest marker vaccine in Kenyan cattle have yielded the following outcomes:

Several candidate marker vaccines were produced using reverse genetics technology to introduce marker proteins into the existing vaccine. These candidate vaccines were to be tested in cattle at Muguga. However, it has not been possible to get permission from the Kenyan biosafety committee to carry out this work. ????

Instead of testing the recombinant vaccines it was decided at a PACE Advisory Committee meeting that the PPR vaccine should be tested in cattle to see if it could give cross-protection against Rinderpest. The initial trial conducted at Muguga is described above. Titration of the vaccine in cattle showed that there was protection but only at the highest dose administered (10^4 TCID₅₀). However, the number of cattle involved was too small to give statistically valid data to evaluate its usefulness as a vaccine for Rinderpest, and at the 12th Advisory Committee meeting in Mali it was agreed that a second trial with larger numbers should be carried out and a budget approved. This second trial has been budgeted for in the PE7, but due to a delay in receiving Pirbright/Muguga accounting for the first trial, it has not yet started.

The CBPP research project was divided into two main domains. The first one was to re-evaluate the efficacy of the T1 and T1sr vaccine strains and particularly to check if increasing the dose for the primary vaccination or by giving a booster dose two month after the first one would significantly induce the protection afforded (which is quite important in case of an emergency vaccination campaign). The final conclusion of this first exercise is that, in the field, only yearly repeated vaccination campaigns are likely to give a satisfactory protection rate. In the case of an emergency it remains compulsory to install strict control of animal movement as it is likely that an emergency vaccination campaign in naïve animals will not induce sufficient protection to prevent the progression of the disease.

The second study was to test the activity of antibiotic treatment for CBPP. A preparation of long-acting tetracycline (oxytetracycline) was used. The findings were similar on two occasions: treatment reduced the clinical signs and the mortality rate but did not succeed in clearing mycoplasmas from the affected animals. The MmmSC strains were re-isolated from these animals specially from the sequesters and the tracheobronchial nodes. Apparently this did not result from antibiotic resistance. This suggests that treated animals may shed lower quantities of mycoplasmas but may still play a role in the transmission of the disease. This is important and it will have to be taken into account in future control strategies.

Field tests to validate a pen-side test for anti-CBPP antibodies which utilises antigen coated latex beads were undertaken in Tanzania and Mali. However, results of the tests revealed that the pen-side test requires further development, especially to achieve better reproducibility.

2.4. Achievements in strengthening the privatisation of animal health delivery services and the involvement of private animal health workers in diseases surveillance

The OIE has relayed WTO agreements related to the global environment for trade in which exporting countries are clearly obliged to have National Veterinary Services able to produce reliable certifications meeting international sanitary regulations. Unfortunately, in most African countries, Governmental Veterinary Services are not able to produce certificates that correlate well with the real sanitary situation on the field. On the other hand, the delivery of veterinary services is very often inconsistent depending on the parts of the countries. Furthermore, in some areas the services are clearly deficient. Considering at first the fact that most of the countries cannot any more afford to maintain an exhaustive organization of veterinary services with a national coverage, secondly considering the reality of many African ecosystems that require extensive farming systems, an alternative way of organizing the animal health management at a national level has to be adopted.

Several options could be sought, but according to the experience of many countries, the assignment of service delivery to a private sector financed by a normal commercial relationship between the provider and the customer seems still to be the most successful and economically viable way to act. For the last ten years, this strategy has been improperly called "privatization of veterinary services", when only the "business" facet of the veterinary activities was concerned. This has been the cause of a lot of misunderstandings and fears in governmental services that have led them to a reluctant attitude towards the concept itself.

The policy promoted by PACE/IBAR has clearly mentioned the different steps that should have been followed by African countries desirous to re-organize their National Veterinary Network (National Veterinary Services, according to the OIE terminology) by creating room for the private sector.

2.4.1. Privatisation

PACE has decided to support the legal status of privatised veterinary services in order to achieve a "Greater privatisation of veterinary services and public/private sector linkage in this field". There was a need to "harmonise legislative positions on the veterinary profession and veterinary drugs". This was done through the following activities executed mainly during the extension phase:

- Development of national guidelines for Community-based Animal Health workers (CAHW) systems, legislative reform, development of licensing procedures for CAHW trainers and trainees, development of agreements with implementing agencies to ensure harmonised approaches and private sector involvement.
- Support to privatisation and veterinary legislation by providing technical support to DVS and statutory bodies to strengthen their capacity to co-ordinate, regulate and supervise para-veterinary professional systems in accordance with OIE guidelines.

From the results of a questionnaire survey conducted during the 6th PACE Annual Co-ordination Meeting in Mombassa in June 2006, all countries allow private veterinarians to operate although their activities are restricted in Cameroon. Most countries also allow CAHWs or auxiliaries to work in the delivery of veterinary services, but always under supervision. The exceptions are Benin, Cameroon and Mali. In Mali there is a large cadre of trained technicians working in the delivery of veterinary services. Thus the role of the private sector in PACE countries is very significant and can be roughly divided into two categories as follows:

- Private veterinarians and other trained professionals (engineers) delivering services to meet PACE objectives e.g. participation in vaccination campaigns and official epidemio-surveillance programmes.
- Technicians, CAHWs and Auxiliaries delivering veterinary services under veterinary supervision.

From the Final Evaluation Mission questionnaire survey, 20 countries stated that PACE had assisted in improving their private veterinary services including the use of CAHWs. This support included training and modernisation of veterinary legislation.

2.4.2. CAHWs

Over the last 10 years, there has been an increasing consensus that CAHWs or their equivalent can play a significant role in the delivery of veterinary services under certain circumstances, namely in situations where conventional veterinary systems cannot operate e.g. in conflict situations, remote ASAL areas etc. CAHWs by the nature of their background, may have limited education and so require careful supervision and strict restrictions on the veterinary tasks that they can carry out e.g. simple treatments, administration of vaccinations etc. The development of the role of CAHWs in veterinary services has been greatest in East Africa, but auxiliaries are also widely employed by veterinary services in certain West African countries. For example, in Guinea there is a significant cadre (estimated 10,000) auxiliaries linked closely with Farmers' Associations, and several hundred of these are employed by private veterinarians in the delivery of veterinary services. Thus the concept of CAHWs is relevant throughout the entire PACE region.

The CAPE Sub-unit was contracted by DFID and although part of its activities were planned to be linked to PACE by working closely with the VLPU, it appears that CAPE operated semi-autonomously and to its own logical framework. Its purpose was to establish sustainable animal health services to control diseases that threaten livestock in the Greater Horn of Africa, especially Rinderpest, and with EDF allocated funds, to carry out analysis/development of CAHW delivery systems in West Africa.

CAPE was very active in carrying out its PACE linked agenda, namely the strengthening of veterinary services through privatisation and community based animal health. It succeeded in bringing together veterinarians and animal health assistants to establish private veterinary practices for pastoralists in the Greater Horn (Ethiopia, Kenya, Somalia, Sudan, Tanzania and Uganda). This was achieved by training, knowledge sharing and advocacy and by the end of its contract; CAPE had developed CAHW privatisation methodologies which were available to other countries. It is concluded that the CAPE activities were implemented efficiently in

the Greater Horn of Africa, although there is no indication that the development of CAHW delivery systems has been extended to West Africa as originally planned.

2.4.3. Strengthening linkages between Central Institutions and livestock farmers

It is clear that a great deal of material to increase farmer awareness and strengthen linkages between the central and field levels has been produced under PACE. Much of this material has been of high quality. It appears, however, that the effectiveness of distributing this material has been variable. In addition, the potential for more widespread dissemination of good quality materials between countries has not been achieved as effectively as it could have been. In hindsight, the PACE programme should have made provision for systematic validation and archiving of awareness materials, and dissemination of examples of best practice for the benefit of all.

2.4.4. Legislation

Overall, the VLPU has accomplished good progress in the development of modernised veterinary legislation to provide a legal framework for private veterinary services. From the results of the Final Evaluation Mission's questionnaire survey, of the 27 PACE countries that responded 23 stated that PACE recommendations had been incorporated into their amended veterinary legislation. These amendments and updating include:

- Delineation of practices allowed by veterinarians and non-veterinarians (engineers, technicians, CAHWs and auxiliaries)
- Regulations concerning mandates to private veterinarians to participate in government activities (e.g. vaccination campaigns, participation in surveillance programmes). This is particularly relevant in francophone West Africa
- Control of veterinary pharmaceuticals

Because a comprehensive analysis of the veterinary legislation in each of the PACE countries was beyond the scope of the VLPU, it recommended in the 2nd Annual PACE Report (June 2002 to May 2003) that a one month mission on legislation by an international expert be carried out for each country. This was not implemented.

Unfortunately, although there has been good progress in the elaboration of modernized veterinary legislation to support privatised veterinary services, much of this renewed legislation has still to be approved by respective parliaments. Thus of 11 PACE countries who modernised their legislation as a result of PACE recommendations and were examined in some detail by the Final Evaluation Mission (Guinea, Senegal, Burkina Faso, Guinea Bissau, Mauritania, Niger, Nigeria, Rwanda, Kenya, Tanzania, Uganda and Sudan), only in Niger, Rwanda and Tanzania has the modernised legislation been approved, although approval of the updated legislation in Guinea Bissau is expected very soon. In Mauritania, the elaboration of the existing legislation to include the working practices of veterinarians including private veterinarians was promulgated in 2004 and the decree applications will be adopted soon.

2.5. Achievement on the establishment of ARIS

Information plays important role in prioritising economically or socially important diseases for research or control purposes and also to make rational resource allocation. These days

international organisations and keeping informed consumers, importers and exporters and the general public is of paramount importance. International certification for freedom from disease is only possible if countries can show verifiable indicators, for which information again is crucial. Hence, an animal resources information system fulfilling these requirements is needed at different levels.

As part of capacity building in collecting timely disease data for early warning and early reaction and also other animal resources data for generating information for planning and decision-making, PACE has developed an information management tool. This tool is the PACE Integrated Database (PID), which was launched at the end of October 2002. The PACE Integrated Database (PID) was named Animal Resources Information System (ARIS) later on due to its capacity to manage various animal resources related data. ARIS is perceived as the adequate response to needs of National Veterinary Services for a comprehensive Information System. It is an information management tool based on Oracle for the storage, transfer and analysis of animal resources data and sharing information generated from these. Unlike other zoo-sanitary databases, ARIS has modules to capture and manage data/information related to:

a. Animal Health:

- Passive surveillance and disease reporting,
- Outbreak emergency reporting,
- Abattoirs surveillance,
- Active surveillance of major TADs

b. Veterinary Institutional Management

- Animal Health Infrastructures & equipments
- Human resources (number and distribution of public & private professionals...)
- In-built performances Indicators to monitor and evaluate veterinary services

c. Livestock Production, numbers, trade and economics

- Population, spatial distributions...
- Production
- Trade of animal and animal products

Thus with the use of ARIS, national animal health authorities can make adequate decisions, plan and organise control programmes in line with the availability of their human and material resources. There is a facility of integrating different data from animal resources sector which enables users to combine or compare data from one module with another (e.g. disease occurrence with livestock numbers in a given area). This approach of integrating data from different sections of Animal Resources ministries or departments is meant to avoid duplication of databases and fragmentation of data and information from these.

Twenty eight of the 30 PACE countries have installed ARIS and are using it in their Headquarters. Not only has the Data Management Unit developed and introduced ARIS, it has also established a Local Area Network in IBAR and has undertaken livestock disease and resources mapping using GIS. It has undertaken training and preparation of manuals on the use of the software it has developed. The Unit has also re-launched the PACE/IBAR website.

The transition ARIS made from PID to its present status and its integration to IBAR removes all doubts that it is a project based database and phases out with PACE. IBAR will ensure the

The feedback received from users both at IBAR and countries' levels following a three-year testing phase, is that ARIS is indeed an all-compassing and very useful information system for Livestock Institutions in Africa. It was unanimously acknowledged that ARIS is the response to needs of African Veterinary Services for an Animal Resources Information system and therefore it should receive the required attention and support to enable the optimal use of all its modules at AU-IBAR and in member countries.

Besides ARIS, PACE has been supporting the establishment of an Information and Communication System (ICS) in AU-IBAR to improve the access and sharing of information with member countries and with International Institutions. PACE established and maintained a LAN with an e.mail system and mailing lists in IBAR. It has supported the development of a website, an insider news flash and currently the development of a digital library database. Under PACE a large amount of communication materials of various formats were also produced at the PCU level and in national components but the sharing of these materials is still limited. ARIS for its optimal use, needs to be a component of this overall ICS at IBAR and member countries. Within AU-IBAR Intranet system, ARIS and the library database will constitute interactive tools that will significantly facilitate the upload of data, reports and communication materials from member countries and vice versa. It is therefore to be seen as a great achievement for PACE to hand over a functioning and modern ICS to IBAR.

2.6. Capacity Building for Communication

The Information and Communication Unit (ICU) of the Pan African programme for the Control of Epizootics (PACE) is one of the Unit established at the beginning of the Programme in 2000, with the main objective of creating and enhancing information management capacity, in particular the establishment of system for managing disease surveillance information. Even though communication is obviously a mandate of all PACE units, the epidemiology and the communication units of the programme were more involved in the achievement of this goal for the whole. The Global Plan of PACE has attributed great importance to the capacity of data management and communication at AU/IBAR.

The main objective of ICU was to develop and introduce a sustainable information system to PACE and advise, facilitate, support, harmonise, catalyse and inform PACE Regional and National Coordination in appropriate data collection, transmission and analysis and information dissemination systems making use of appropriate Information and Communication Technology (ICT). Experiences acquired during the process and system established would be the basis for future IBAR information management system.

One of the main achievements of the ICU was to establish an information system for PACE, which can later serve as basis for IBAR's information system. This information system has been called PACE Integrated Database (PID) first, then Animal Resources Information System (ARIS), and has been largely presented in part 5. above.

During the last five years, IBAR in general and PACE in particular have undergone significant shift from paper based information management to digital age. This was possible by the introduction of networked computing facilities and improved Internet connectivity. Data safety and security as well as preventive maintenance of computing facilities were

instituted. Training of ICU staff in database operation and administration and GIS was another area given priority regarding capacity building in information management.

With the objective of unlocking information contained in paper documents and allow wider information sharing, The ICU mobilised two consultants in 2001 to sort valuable paper documents from PARC implementation, scanned these and produced interactive CD-ROM. The CD-ROM runs using an Internet browser and had search facility. This first material named PARC and PACE Information Resource CD-ROM Volume I, had also Global Plan and Annual Work Plan and Cost Estimate (AWP & CE) of PACE Regional and National Programmes. The CD-ROM served to fill the gap of lacking Website for information dissemination and beyond to share information with anybody with a computer, which has a CD-ROM drive. A second volume of this CD-ROM was produced in 2002 with more information including country baseline data and contact address with interactive map of countries.

Monthly disease occurrence constitutes the bulk of data collected from AU member states. Data collected from countries in this way are compiled, analysed and Information generated is published on Pan African Animal Health Yearbook by the ICU. The ICU applied for and secured the International Standard Serial Number (ISSN) for the hard copy publication of the Yearbook. There are two separate ISSN for the English (1811-007X) and the French (1811-0088) language publications. In addition to increased rate in reporting and wider geographical coverage of reporting, more and more countries are shifting from paper based reporting to electronic filing of reports as e-mail attachments. Efforts made by the ICU have also contributed to increased number of reporting to the OIE. The disease-reporting rate to the OIE from African countries rose from 60.1% in 2000 to 90.5% at the end of 2003, an increase over 30% in three years time.

One of the tasks the ICU proposed and actively engaged in was the harmonisation of data collection and reporting procedures with other international and regional organisations. Often countries find it difficult to report to several international and regional organisations on regular basis using different forms, even when the type of data remain more or less the same. To avoid this reporting burden on member states, the ICU was looking into possibilities of harmonising and where possible automating the production and submission of reports from these countries to the organisations. In line with this, ARIS has incorporated a facility which allow countries to generate the monthly disease occurrence report to OIE, commonly know as SR-3, and where Internet connection is available directly send this report by e-mail. This facility is currently used by Cote d'Ivoire, Ghana and Uganda.

The ICU had planned and implemented during the second year work programme compiling epidemiological data and update Eco-zone maps of Eastern and Central Africa. The purpose of this information is to assist reviewing current Rinderpest eradication strategy in the Region. Information on cattle numbers, movement patterns, most recent Rinderpest outbreaks and strategies followed by countries in the then two suspected foci in the Eastern African region and the *Cordon Sanitaire* as well as the adjust areas is compiled and presented as maps. A total of six maps with specific information and an additional one combining information from the previous six have been produced using GIS software, MapInfo Professional 5.5. Data collected from the questionnaire circulated to member countries, PACE Global plans of national components, Digital Chart of the World (DCW) and some specific sources were used to compile the following maps.

Map 1 General Map of the area - This map depicts general features of the Eastern and Central Africa. It is a combination of a 3 dimensional (3D) map of the area under consideration with political boundary and capital cities of countries.

Map 2 Density of cattle - Estimated number of cattle at the second administrative level (regions or provinces) was collected from most countries and entered to MapInfo for dot density mapping. Cattle population at sub-national level was not available for Djibouti and Central African Republic (C.A.R.). Hence, national figures were used to map the density.

Map 3 Cattle movement patterns - Three patterns of cattle movements, those for transhumance, trade and rustling are mapped.

Map 4 National parks and Buffalo distribution - This map depicts the distribution of wildlife parks and the density of buffaloes in the area under consideration. The sources of cartographic data are ADS (1995) whereas the density of buffaloes was taken from African Antelope Database (1998).

Map 5 Recent Rinderpest outbreaks - Data on most recent rumours, suspected or confirmed outbreaks of Rinderpest were gathered from the questionnaires circulated, lists of outbreaks compiled by PARC Epidemiology Unit and other sources such as consultancy reports from CAPE.

Map 6 Rinderpest zonation map - This is a map displaying different zones created by countries to make declaration of their Rinderpest status to OIE.

Map 7 Combined Information - as the name suggests, this is a map with most of the information put together (different layers overlaid one on top of another).