

# ANIMAL PRODUCTION AND HEALTH

# NEWSLETTER



Joint FAO/IAEA Division of Nuclear  
Techniques in Food and Agriculture  
and FAO/IAEA Agriculture and  
Biotechnology Laboratory, Seibersdorf  
International Atomic Energy Agency  
Vienna



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<http://www.iaea.org/programmes/nafa/>

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## TO THE READER

Dear Colleague,

As we enter the new millennium, it is tempting to look back but better to look forward and in particular, consider where we would like to be in the year 2010. You may recall that in 1986, we were the subject of an external review through a PPAS (Programme Performance Appraisal System). What emerged was a medium-term plan of support which clearly identified what should be done for the following 5–7 years. We are now well over halfway through this programme and I would hope that as you read this Newsletter, it is clear that most of the goals we set are being achieved.

But what of the longer-term future? Where should we be going and what should be the process for determining this? It is worth noting that as we embark on this task, both FAO and IAEA are changing the way that they “do business”. Previously, emphasis was on attaining an output, e.g. a publication, the holding of a meeting. This has now changed to attaining an outcome, e.g. what was the result of holding the meeting, what has the publication achieved. To do this, it is necessary to re-think the whole process of planning, implementing, monitoring and evaluating our programmes.

I would like to adopt these new approaches for developing a longer-term strategy plan for this Sub-programme. A fundamental issue is that the process should not start by considering where we are now, but where we wish to be in the future and in our case in the year 2010. For this, it is necessary to produce a vision statement for the year 2010 that describes the state to be achieved at that time, the key stakeholders, the strengths and weaknesses of the vision and any key assumptions. Once this is agreed, one can set a series of objectives and linked outcomes, to achieve the vision. These objectives should then be prioritized and considered against available and required resources. Finally, the objectives should be broken into a series of elements (e.g. co-ordinated research projects, consultants meetings, publications, technical co-operation projects) that need to be undertaken to achieve

the objective. These will be derived along with performance indicators, to allow performance management.

Critical to the whole process is the involvement of all key stakeholders and the most important one for us is you! Particularly in the initial vision phase, your input is vital to help identify the major issues and what you would like to have seen changed by the year 2010. This is why you will find in this Newsletter a copy of a letter we are sending to as many of you as possible requesting your input to this process for the animal production component of the Sub-programme. If you do not receive this letter, please use this copy to reply to us. We need your involvement, ideas and criticism. This vision and its achievement must be a joint undertaking with you and your Governments as the final beneficiaries. Rest assured that as we go through this whole process in the next 6–9 months, we will keep you involved and informed and continue to look for feedback from you. I hope that by the end of this New Year, we jointly will have developed a strategic plan to achieve the vision by 2010!

As I mentioned earlier, there are detailed accounts in this Newsletter on all our activities, but I would particularly draw your attention to the section on rinderpest. We have a number of activities now on-going and I have put these under one heading. I am sure you will appreciate the considerable effort we are now putting into the rinderpest eradication process. For those of you who have been involved in or following the FAO Global Rinderpest Eradication Programme (GREP), you will know that final eradication is within grasp but it does require a final sustained effort if success is to be achieved. We are firmly committed to this goal but at the end of the day, it will be the activities in Member States that will determine if eradication can be achieved by the year 2010.

There are two important staff changes that I would like to mention. Firstly, it is with considerable regret that I have to inform you

of the departure of Mark Robinson as Head of the Animal Production Unit at the Agriculture and Biotechnology Laboratory in Seibersdorf. Mark and I have worked closely together during the past four years, developing and directing this Sub-programme and I greatly appreciate his professionalism and technical abilities. He has been the architect behind our current quality assurance programme and, in particular, has been the driving force assisting the OIE in preparing "Management and Technical Requirements for Laboratories Conducting Tests for Infectious Animal Diseases" that is currently under consideration by OIE Member States. Mark will be greatly missed and on behalf of everyone in the Sub-programme and the many counterparts he has assisted I would like to express our considerable gratitude for his help and wish him all the very best for the future. For those of you who might be interested, Mark's position will be shortly advertised and a copy of the vacancy notice can be obtained from the IAEA Homepage or more directly from me.

I would also like to take this opportunity to welcome "on-board" Dan Ezeokoli. Many of

you will know Dan from his days in Africa where he worked for many years on rinderpest as an FAO/IAEA Contract holder in Nigeria. More recently, Dan has been at the Veterinary Faculty of West Indies rising to the position of Dean of Faculty. He has considerable experience in many aspects of disease diagnosis and surveillance and will focus on supporting us during the next 12 months specifically in the rinderpest area.

Finally, may I take this opportunity to wish you all a very happy, successful and prosperous New Year and to remind you again that we are here to assist you, so please let us know what you need and we'll do our very best!

With best wishes,

A handwritten signature in black ink, appearing to read "M. H. Jeggo", with a horizontal line drawn through the signature.

Martyn Jeggo  
Head, Animal Production and  
Health Section

## A. STAFF

**IAEA Headquarters, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Vienna International Centre, Wagramer Strasse 5, P.O. Box 100, A-1400 Vienna, Austria, Telephone: +43 1 2600, Facsimile: +43 1 26007**

### *Joint FAO/IAEA Division*

James D. Dargie	Director
Manase P. Salema	Deputy Director

### *Animal Production and Health Section*

Martyn H. Jeggo	Head of Section
Axel Colling	Technical Officer
John Crowther	Technical Officer
Ron Dwinger	Technical Officer
Harinder Makkar	Technical Officer
Oswin Perera	Technical Officer
Anita Erkelens	Associate Professional Officer
Andrea Gervelmeyer	Associate Professional Officer
Daniel Ezeokoli	Sabbatical

#### *Secretaries*

Roswitha Schellander  
Rosario León de Müllner

### **FAO/IAEA Agriculture and Biotechnology Laboratory, Animal Production Unit of the IAEA Seibersdorf Laboratory, A-2444 Seibersdorf, Austria**

Christopher J. Rigney	Head, Agriculture and Biotechnology Laboratory
Mark Robinson	Head of Unit
Dierk Rebeski	Technical Officer
Axel Colling	Technical Officer
Mutasem Khadra	Laboratory Technician
Herbert Haas	Laboratory Technician
Mamadou Lelenta	Laboratory Technician
Beata Rogovic	Laboratory Technician
Eva-Maria Winger	Laboratory Technician

#### *Secretary*

Anna Schirrhofer

## B. FORTHCOMING EVENTS

### **Consultants Meeting on Rinderpest Lineage 2**

Technical Officer: John Crowther

A consultants meeting is planned from 31 January to 4 February 2000 in Vienna, Austria.

Active discussions have taken place between the FOA/IAEA Joint Division, FAO, CIRAD, Pirbright and OAU IBAR concerning the implications of lineage 2 rinderpest virus in the rinderpest eradication campaign. Factors discussed included the current use of the cELISA for detection of antibodies against lineage 2, whether there is the need to produce a more specific assay to measure antibodies

against lineage 2 virus, the composition and preparation of serum panels to evaluate tests for rinderpest antibody detection, and parallel testing of sera and the examination of raw data to assess conclusions based on experiments involving lineage 1 and 2 rinderpest viruses. The purpose of the meeting is to produce technical guidelines to help laboratories perform sero-surveillance using existing assays, to define the problem of lineage 2 more clearly in terms of risk assessment, and to reduce the possible confusions arising from work performed by different laboratories and research institutes.

### **Second Project Review and Planning Meeting of the IAEA/RCA Project on "Feed Supplementation and Reproductive Management of Cattle" (RAS/5/035)**

Technical Officer: Oswin Perera

The meeting will be held from 14 to 18 February 2000 in Kuala Lumpur, Malaysia.

The objectives are:

- To review the results from on-going activities on the two project components (feed supplementation and improvement of reproduction/AI), at regional and national levels;
- To establish a unified methodology to assess cost-benefit ratios for the supplementation strategies;

- To agree on a harmonized protocol for improvement of reproductive management and provision of non-pregnancy diagnosis (N-PD) services to farmers; and
- To develop future work plans for both project components.

Full information has been forwarded to RCA National Co-ordinators in participating Member States.

### **First RCM on "Use of Non-structural Protein of Foot-and-Mouth Disease Virus (FMDV) to Differentiate between Vaccinated and Infected Animals" (D3.20.20)**

Technical Officer: John Crowther

The first RCM is scheduled from 20 to 24 March 2000 in Rio de Janeiro, Brazil.

The meeting will review the current situation with regard to research concerning the use of non-structural proteins of foot-and-mouth disease (FMD) virus to allow discrimination

of vaccinated and infected livestock. Secondly to examine the specific sera available in each of the laboratories to allow comparison of tests, to outline the protocols for each of the assays provided to the Research Contract holders and lastly to finalize work plans and equipment and reagent needs for the year.

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**Third RCM on “Use of Nuclear and Colorimetric Techniques for Measuring Microbial Protein Supply from Local Feed Resources in Ruminant Animals” (D3.10.21)**

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Technical Officer: Harinder Makkar

The third RCM will be held from 20 to 24 March 2000 at the University Putra Malaysia, Selangor, Malaysia, to assess the progress of

the work conducted and to develop procedure(s) to assess the impact of the techniques developed.

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**Meeting To Increase Awareness Concerning Rinderpest**

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Technical Officer: John Crowther

The meeting is planned to be held in March 2000 in Pakistan.

The meeting will be supported by the Technical Co-operation Department of IAEA and co-ordinated through the Pakistan Atomic Energy Commission. The meeting is intended to increase awareness concerning rinderpest and foster understanding and co-operation through:

- Examining the world situation with respect to rinderpest;
- Stressing the measures needed to control and then eradicate rinderpest in Pakistan;
- Clarifying responsibilities in national TC project applications;
- Setting up performance indicators;
- Identifying equipment and reagents needs;
- Promoting co-ordination between West Asian countries and Pakistan.

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**IAEA/RCA Training Workshop on “Production of Iodinated Tracer for Self-coating RIA of Progesterone” (RAS/5/035)**

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Technical Officer: Oswin Perera

This Training Workshop will be held from 8 to 12 May 2000 in Bangkok, Thailand. The deadline for nominations is 15 March 2000.

The objective of the course is to develop regional expertise in the production of radio-iodinated tracer progesterone for use in the progesterone RIA. It is open to eight qualified participants from RCA Member States (Regional Co-operative Agreement for Asia and the Pacific) which have the capability to

produce and distribute radio-iodinated tracer progesterone to other Member States within the region. Preference will be given to those currently engaged in the production of reagents for use in RIA either in the human health or animal production sector.

The prospectus and further information have been forwarded to RCA National Co-ordinators in participating Member States.

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**IAEA/AFRA Training Workshop on “Production of Standards and Internal Quality Control (IQC) Materials for Self-coating RIA of Progesterone” (RAF/5/041; AFRA II-17)**

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Technical Officer: Oswin Perera

This Training Workshop will be held from 22 to 26 May 2000 in Mauritius. The deadline for nominations is 15 March 2000.

The objective of the course is to develop national expertise in the production of standards and internal quality control (IQC) samples and to further develop collaboration and co-ordination within the region to operate a

network of RIA laboratories in a self-sustaining manner. The course is open to 16 qualified participants from AFRA Member States (Regional Co-operative Agreement for Africa), which have the capability to perform radioimmunoassay (RIA) for measuring progesterone in milk and/or blood of domestic animals. Preference will be given to those currently participating in the regional projects

RAF/5/041 (AFRA II-17) and RAF/5/046 (AFRA II-24).

The prospectus and further information have been forwarded to AFRA National Coordinators in participating Member States.

**Meeting to Review Results on AIDA and Plan Future Strategies, IAEA/AFRA Project on “Increasing and Improving Milk and Meat Production” (RAF/5/046; AFRA II-24)**

Technical Officer: Oswin Perera

This meeting will be held from 12 to 16 June 2000 in Uganda. The objectives are to review the results obtained and the experiences of project counterparts in the use of the computer database AIDA (Artificial Insemination

Database Application) for recording, analysing and reporting field and laboratory data. The meeting will also formulate plans and future strategies for project activities.

**General Information for Training Courses/Workshops**

**Application procedure:**

Nominations may be submitted on the standard IAEA application form for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority or the Office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than the deadline given for each training course. Nominations received after this date or applications, which have not been routed through one of the afore-mentioned channels, cannot be considered.

Advanced nominations by facsimile (+43-1-26007), or e-mail (Official.Mail@iaea.org) are welcome. The facsimile/e-mail should contain the following basic information about the candidate: name, age, academic qualifications, present position including exact nature of duties carried out, proficiency in the language of the course and full working address including telephone/facsimile numbers.

**Language certificate:**

In the case of countries in which the language of the course is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in the language of the course. This certificate must be issued by a language school or cultural institution, or an embassy of

a country in which the language of the course is spoken.

**Administrative and financial arrangements:**

Nominating Governments will be informed in due course of the names of the candidates who have been selected and will at that time be given full details on the procedures to be followed with regard to administrative and financial matters.

During their attendance at the course, participants from countries, eligible to receive technical assistance, will be provided with a stipend sufficient to cover accommodation, food and minor incidental expenses. The IAEA will also bear the full cost of their round-trip air ticket, economy class, from their home countries to the place of the training course and return. Shipment of accumulated course materials to the participants' home countries is not the responsibility of the IAEA.

The organizers of the course do not accept liability for the payment of any cost or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the course, and it is clearly understood that each Government, in nominating participants, undertakes responsibility for such coverage. Governments would be well advised to take out insurance against these risks.

## C. PAST EVENTS

### **First Project Co-ordination Meeting of the IAEA/AFRA Project on “Increasing and Improving Milk and Meat Production” (RAF/5/046; AFRA II-24)**

Technical Officer: Oswin Perera

This meeting was held from 17 to 21 May 1999, and was hosted by the Ministry of Agriculture, Rural Development and Fisheries in Rabat, Morocco. It was attended by nine of the ten nominated project counterparts from AFRA Member States (MSs) and six local participants who are collaborating in the activities undertaken as a Model Project component in Morocco. It was supported by an IAEA expert (Dr. Mario Garcia, Peru) and the Technical Officer.

The specific objectives of this meeting were to (a) review the current status of smallholder dairy cattle production and the existing AI services in participating MSs; (b) develop individual country work plans; (c) review and refine the overall regional work plan; (d) provide information and training on the methodology developed through a recently concluded FAO/IAEA Co-ordinated Research Project on the use of progesterone measurement for monitoring and improving AI services and for provision of non-pregnancy diagnostic (N-PD) services to farmers (D3.10.20); and (e) formulate conclusions and recommendations for implementation.

The main conclusions were:

- There is a need for more MSs to join the project, especially those with active artificial insemination (AI) services.
- The information presented at the meeting showed that there is a need to (a) identify the major factors limiting reproductive efficiency in dairy cattle on smallholder farms subjected to AI, and (b) improve the efficiency of AI services and the standard of reproductive management, currently used by cattle farmers. There is considerable value in the application of progesterone RIA to achieve these needs.
- Facilities and expertise for the measurement of progesterone by the “Self-coating RIA” (ScRIA) method already exist in the majority of participating MSs. In others, they can be established in the

immediate future with relatively low inputs.

- There is a need for exchange of information and expertise between AFRA MSs on methods for improving reproductive efficiency in dairy cattle on smallholder farms. This will be facilitated by the adoption of a uniform approach to the generation and handling of data and reporting of results.
- The methodology and protocol used by the FAO/IAEA Co-ordinated Research Project for monitoring and improving AI services in Asia and Latin America (D3.10.20) are relevant and realistic for use under African conditions and can be implemented in the current project.

The main recommendations were:

- All participating MSs must clearly identify the main constraints to successful AI programmes, through the conduct of an initial survey, using the three-sample protocol for progesterone measurement (days 0, 10–12 and 21–23 in relation to AI).
- Concurrently, the need for and feasibility of establishing N-PD and related services to farmers based on progesterone assay must be evaluated.
- Based on the results of the survey, appropriate strategies should be formulated for improvement of the efficiency of AI services and reproductive management by farmers. Implementation of these strategies should commence thereafter.
- The standardized protocol for field and laboratory activities, which was discussed and adopted at the meeting, should be used during the survey phase. The Artificial Insemination Database Application (AIDA) computer program, on which training was conducted and a copy provided to each participant, should be used for recording and preliminary analysis of data.

- Existing RIA facilities in each MS should be made available for the project. Where they do not exist at a location which can be utilized for the project, IAEA should assist in the establishment of decentralized mini-RIA laboratories, through provision of essential equipment and training of technical staff either within the country or, where expertise does not exist, in other laboratories within the region.
- The PCs of this project should maintain close contact with the PCs of the on-going AFRA II-17 project (RAF/5/041) in their countries, and with the AFRA National Co-ordinators.
- Regular contact and exchange of information between the PCs of participating MSs and IAEA should be strengthened through the establishment of an E-mail connection network.
- Counterpart institutes should provide

adequate infrastructure, manpower, local operative funds and facilities for field transport, sample collection and laboratory analyses. The PCs should also secure other sources of funding to further enhance the activities of this project.

- The PCs must ensure the timely submission of biannual reports to IAEA (June and December) with sufficient information on achievements including technical and scientific data.

The requirements for equipment, sampling materials and RIA kits were identified, and PCs were requested to forward specific requests for expert services and training where necessary. The next meeting of PCs to review results and experiences on the computer database AIDA is planned for 12–16 June 2000 in Uganda, and the mid-term review and co-ordination meeting is scheduled for 6 to 10 November 2000 in Tunisia.

#### **IAEA/RCA Regional Training Workshop on “Self-coating Solid-phase Radioimmunoassay (ScRIA) for Measuring Progesterone in Milk of Ruminant Livestock” (RAS/5/035)**

Technical Officer: Oswin Perera

The Workshop was held from 23 to 27 August 1999 in Mattaram, Indonesia.

This Workshop was hosted jointly by BATAN (Jakarta), the University of Mataram (Lombok) and the Governor of West Nusa Tenggara Province. It was held at Mataram University and was attended by 13 of the 14 selected foreign participants and by all three local participants. The Course Director was Mr. Chairussyuhur Arman (Mataram) and the local lecturers were Dr. Nelly Hendratno (Jakarta) and Dr. Latief Toleng (Ujung Pandang). An IAEA expert on mission in Lombok under INS/5/025 (Dr. Mario Garcia) and the IAEA Technical Officer also presented lectures, assisted with laboratory exercises and moderated the discussions.

The Workshop was aimed at developing the capability within counterpart institutes in RCA Member States to establish and use the Self-coating RIA (ScRIA) technique, which has been recently developed by the FAO/IAEA Sub-programme on Animal Production and Health, for measuring progesterone in milk and blood of farm

livestock. The objectives were to conduct hands-on training on the procedures for performing the assay, provide information on its field applications under smallholder dairy production systems for the monitoring and improvement of reproductive management and artificial insemination (AI) services, and to discuss the results obtained under a recently concluded FAO/IAEA Co-ordinated Research Project (CRP) on the use of RIA data in combination with collateral information stored and analysed using a computer database AIDA (Artificial Insemination Database Application) developed for the purpose.

The format of the Workshop proved appropriate for achieving the objectives. The combination of lectures, laboratory exercises and discussions provided the participants with the required knowledge and skills to establish and perform the ScRIA for progesterone measurement.

The host institute provided excellent facilities and logistic support. The training of a local scientist in the ScRIA technique at the Agency’s Laboratories in Seibersdorf, which was accomplished some weeks before the

Workshop, ensured adequate local technical support for all practical exercises.

The interest and sponsorship of the Provincial Governor of West Nusa Tenggara, the Rector of Mataram University and senior management of BATAN for this Workshop gave a clear message of firm commitment at the highest levels to improving livestock

production in Indonesia, and confidence in the approach being taken by the Agency.

The plans for developing capability within the Asia/Pacific region for producing selected assay reagents (in particular, iodinated progesterone tracer and monoclonal antibody) can now go ahead. Countries, which can effectively participate in this initiative, were identified during the Workshop.

### **Final RCM on “Use of Immunoassay Methods for Improved Diagnosis of Trypanosomosis and Monitoring of Tsetse and Trypanosomosis Control Programmes in Africa” (D3.20.13)**

The final Research Co-ordination Meeting (RCM) of the FAO/IAEA Co-ordinated Research Project (CRP) on use of immunoassay methods for improved diagnosis of trypanosomosis and monitoring tsetse and trypanosomosis control programmes” was organised from 6 to 10 September 1999 in Addis Ababa, Ethiopia.

All fifteen Research Contract holders (RCH) and the four Research Agreement holders (RAH) involved in the CRP were able to attend the meeting. One observer from Ghana and six observers from Ethiopia were present. In addition, a lecturer on Geographic Information Systems (GIS) was invited.

The meeting was held at the International Livestock Research Institute (ILRI) and started with an official opening attended by the acting FAO representative and a number of representatives from Ethiopian institutes and organisations. Representatives from the Ministry of Agriculture, the Ethiopian Agriculture Research Organisation (EARO) and the Ethiopian Science and Technology Commission were present.

Each RCH had prepared a manuscript detailing the results of the research findings and was given an opportunity to present and defend these during the meeting.

The four RAH gave key-note lectures on various aspects dealing with animal trypanosomosis. The presentations covered new developments in the field of diagnosis (using the polymerase chain reaction), application of the antibody-detection ELISA in southern Africa and Indonesia, epidemiological aspects of declaring an area

free of disease and the progress to develop a decision tool to identify priority areas for tsetse control/eradication. In addition, the national co-ordinator of the tsetse eradication programme in the Southern Rift Valley was invited to present a lecture on the progress and future plans of the project.

A workshop of one day was organized to demonstrate and use a database designed for the analysis of tsetse and trypanosome related data (DAVID) and to instruct the participants in the use of a global positioning system (GPS) for the collection of geo-referenced samples in the field.

The research results and the key-note lectures will be published in a Technical Document together with the complete set of conclusions and recommendations. Some of the most important conclusions and recommendations are cited below.

The meeting concluded that the application of the antibody-detection ELISA is a useful tool and most suitable to characterize trypanosomosis risk areas and to monitor over time the impact of control programmes. It is not appropriate for individual diagnosis or for detailed transmission studies.

Different diagnostic tests may be required for specific purposes and no single test will be suitable for all applications as related to the diagnosis of trypanosomosis. It is felt that more research should be promoted to develop new diagnostic techniques such as PCR–ELISA that will be useful for purposes for which the antibody-detection ELISA is not suitable, such as individual diagnosis and transmission studies.

The distribution of ELISA plates pre-coated with antigen has many advantages over existing formats used for the diagnosis of trypanosomosis including storage, shelf-life, transport and test reproducibility.

Field use in the different countries confirmed that plates coated with denatured antigen of *T. congolense* and *T. vivax* were more reliable and robust than those coated with native antigen.

It is recommended that plates coated with denatured antigen of *T. congolense* and *T. vivax* and should become the standard format for use in antibody-ELISA.

The introduction of quality control including the routine use of internal quality control charts is seen as an important improvement. The use of their own internal quality controls enabled RCHs to assess the assay performance locally without external support. This allowed the identification and correction of problems in all testing components, for example, water

quality, test control performance and sample handling.

The antibody-detection ELISA for bovine trypanosomosis should be used routinely in all major AAT control programmes. In order to make it readily available for such application and for use in laboratories in Africa, a suitable laboratory for production and distribution should be identified in Africa.

The FAO/IAEA antibody-detection ELISA has been used in other countries outside Africa and could be useful in situations where non-tsetse transmitted pathogenic trypanosomes are prevalent.

The programme has improved the infrastructure in many African laboratories and facilitated the training of personnel in the diagnosis of trypanosomosis. Moreover, human resource development has enabled some RCHs to act as regional experts. The programme has successfully promoted ELISA as a generic technology in these institutes.

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**IAEA/AFRA Training Workshop on “Production of Iodinated Tracer for Self-coating RIA of Progesterone” (RAF/5/041; AFRA II-17)**

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Technical Officer: Oswin Perera

This Training Workshop was held from 16 to 20 October 1999 at the Radioisotope Application Institute of the Egyptian Atomic Energy Agency, Inshas (near Cairo), Egypt. It was attended by five of the six nominated participants from AFRA Member States, as well as five local participants. The course director was Prof. Ibrahim Issa Ibrahim, and the resource persons were Dr. Rukhsana Ahsan (IAEA Expert, UK) and Mr. Mutasem Khadra (Animal Production Unit, FAO/IAEA Agriculture and Biotechnology Laboratory, Seibersdorf).

The purpose of the course was to develop regional expertise in the production of radio-iodinated tracer progesterone for use in the progesterone RIA. It covered fundamentals of solid-phase RIA, requirements of a suitable

tracer for progesterone RIA, principles of conjugation and radio-iodination of hormones and purification of end-products, practical aspects of radio-iodination and purification of progesterone tracer, and evaluation of tracer.

It was concluded that the progesterone radio-iodination technique, as practiced at this Workshop, was capable of yielding a tracer which was fully acceptable for use in the FAO/IAEA self-coating RIA method. Initial estimates indicate that the cost of tracer production by this method would be at least 6–8 times cheaper than that of the commercial product. Therefore, its use on a regional basis should be pursued and requires some additional validation and the appropriate installation of production, quality control and distribution mechanisms at the regional level.

## **Second RCM on “The Monitoring of Contagious Bovine Pleuropneumonia in Africa Using Enzyme Immunoassays” (D3.20.18)**

Technical Officer: Andrea Gervelmeyer

The second RCM was held in Lusaka, Zambia, from 27 September to 1 October 1999. Eight Research Contract holders and three Agreement holders attended the meeting.

The FAO/IAEA Research Contract holders gave presentations on the performance of the competitive CBPP ELISA in their laboratories and presented the results of their research studies carried out since the first RCM.

Important issues discussed at the RCM were the quality assurance of cELISA results and latest research results on CBPP diagnosis and control. During a visit to an abattoir, the role of meat inspection in CBPP control programmes and important sanitary measures in view of transport of animals from CBPP affected areas to slaughter in an outbreak scenario were discussed. The presentations of the Research Contract holders showed that in most laboratories the CBPP cELISA has been successfully established and performed within the acceptable control limits. Means to assure the quality of cELISA results and to identify problems were put in place. Where cELISA

results were performed satisfactorily, the cELISA has been used to monitor sero-conversion in affected herds where no control measures were implemented, where treatment and slaughter were practised, to measure the prevalence of CBPP in different herds and to confirm the specificity of the cELISA in CBPP-free countries. The findings showed that the cELISA results correlate well with the history of CBPP in the study herds as well as with results of the complement fixation test (CFT), the test prescribed by OIE for international trade. The first priority for animal disease control in Africa is the completion of eradication of rinderpest. Following rinderpest eradication, the next priority for animal disease control is CBPP. Clearly defined control strategies for CBPP need to be developed which should be based on epidemiologically valid information on the distribution and prevalence of CBPP. Countries should establish or enhance the level of regional co-operation in the control of animal movement and in the sharing of information on the occurrence of CBPP including expertise in CBPP diagnosis.

## **Fifth (Wrap-Up) Co-ordination Meeting on “Support for Rinderpest Surveillance” (RAW/5/004)**

Technical Officer: John Crowther

The meeting took place from 10 to 14 November 1999 in Damascus, Syria.

Participants from Afghanistan, Lebanon, Iran, Iraq, Jordan, Syria, Saudi Arabia, Turkey, Kazakhstan and Yemen attended, as well as experts from Pakistan and FAO, Rome. This meeting included the presentation of country reports, discussions on the perceived threat to the region with regard to the world situation of rinderpest, measures needed to assure the sustainability of activities after completion of the project, formulation of recommendations for the West Asian region and for the participating countries regarding policy on rinderpest disease surveillance and declaration of freedom from rinderpest. The early cessation of vaccination was strongly emphasized by both the IAEA and FAO

representatives. There was agreement that the laboratory data showed that cessation of vaccination was a realistic option for most countries in the region in the very near future. The participants recognized this as a key issue, so as to allow possible foci of disease to be identified. There was concern that Pakistan and Afghanistan were still endemic foci and that this was the main threat to the region. There was also recognition that Iran's efforts were vital in protecting the disease status of the WA region. It was stressed that the Regional project was a unique and efficient approach and that termination of the project is a great pity, particularly until all countries of the region would enter into a surveillance phase. It was also stressed that the region was at a crucial phase concerning the control of rinderpest and that interest from national governments needed to be stimulated. The

meeting emphasized that the central role taken by the Agency in Vienna was highly successful and essential. It was concluded that all countries should seek national support as well as support through national projects for the 2001 TC cycle.

### Conclusions and Recommendations

The participants of the meeting:

- Confirmed their commitment to the global eradication of rinderpest and indicated that the co-operation achieved through participation in the regional Model Project RAW/5/004 served as an excellent and unique mechanism for technology transfer, data exchange and stimulation and co-ordination of optimal management strategies. It had proved invaluable in creating an enabling environment for the application of the technology to rinderpest eradication by raising awareness of the issues and in information dissemination. They stressed the valuable contribution the project had made to the progress of GREP in the region.
- Recognized that good progress has been achieved in the progressive control of rinderpest in West Asia, and stressed that rinderpest remains a major cause for concern, while it is left in a small number of foci. The risk of renewed epidemics must not be underestimated. These foci have to be eliminated before the threat of rinderpest to West Asia is removed.
- Noted that the existence of uncontrolled RP in Pakistan and Afghanistan is a threat to the entire region and urged international organizations to provide all necessary support to the Pakistan national rinderpest eradication project and to Afghanistan as a matter of the greatest urgency.
- Indicated that a workshop should be held in Pakistan with the support of IAEA and FAO at the earliest possible opportunity in order to enhance awareness of the national rinderpest control strategy.
- Stressed that suspected endemic rinderpest persistence in Yemen should also be considered a high priority for assistance to strengthen surveillance and control.
- Noted that the project RAW/5/004 is now officially closed, but that countries who more recently entered into participation in

the project (Afghanistan, Kazakhstan and Uzbekistan) need more support to enhance their capabilities, which would in turn generate more confidence in other countries of the region.

- Indicated their concern over peste-des-petits ruminants (PPR) as an emerging disease of increasing importance to the region because of its effect on small ruminant production and its relation to rinderpest sero-surveillance. Further clarification concerning the supply and cost involved with the homologous PPR strain used in vaccination was sought.

Recommended that:

- The IAEA and FAO should seek to find a means of continuing the regional activities undertaken during the course of the project with emphasis on technical support and co-ordination meetings.
- A contingency plan with contingency funding be considered vital to progress in ending mass vaccination and verifying rinderpest freedom in the whole region. FAO should undertake measures to facilitate this process.
- The rinderpest epidemiological situation, which led to the outbreak of rinderpest confirmed in Amur Region of the Russian Federation in 1998, should be clarified. Uncertainty over the rinderpest status of the adjoining areas of Mongolia and China needs to be resolved. IAEA and FAO are requested to focus attention to this end.
- The IAEA should provide support to Kazakhstan to establish ELISA techniques for the diagnosis, sero-monitoring and surveillance of rinderpest and rinderpest-like diseases.
- The IAEA should re-establish the linkage with regard to rinderpest surveillance in Uzbekistan, which is a most important sentinel country for rinderpest.
- Yemen and Pakistan should apply to IAEA for national TC projects on sero-monitoring and sero-surveillance for rinderpest.
- PPR should merit more attention with the development of a strategy for progressive control. Considerations include encouraging vaccine and diagnostic kit production within the region, the availability of the homologous vaccine seed

strain, quality assurance of vaccines and epidemiological studies to elaborate sound cost-effective control strategies.

- Newer technologies such as PCR should be developed for application in particular for

the differential diagnosis of rinderpest, and transferred to countries where appropriate.

### **Regional FAO/IAEA Workshop on “Internal Quality Control of the Rinderpest ELISA and ELISA Troubleshooting” (RAF/5/043)**

Technical Officer: Andrea Gervelmeyer

The Workshop was organized at the ISRA/LNERV, Dakar, Senegal, from 1 to 5 November 1999 and attended by 20 participants from 16 IAEA Member States and four FAO Member States. During the Workshop, techniques of internal quality control for monitoring the performance of the rinderpest ELISA, problem identification and solving were explained to participants. In practical sessions the participants were guided through the individual steps of calculating and charting leading to the generation of overviews of assay performance over time. They produced various charts showing the performance of the rinderpest ELISA. The internal quality control charts produced in the course of the Workshop served as examples for the identification of assay problems. Factors affecting assay performance and measures to be taken to improve the performance of the assay were discussed with

participants. In a practical session on laboratory equipment maintenance, solutions to frequently occurring problems with ELISA laboratory equipment were demonstrated and discussed with course participants. For the analysis of results of samples from sero-surveillance surveys, possibilities of producing frequency histograms and carrying out simple statistical calculations were demonstrated and practiced. With a view towards international trade and the resulting demand for quality assured laboratory results concerning disease/health status of trade animals, good laboratory practice, strict adherence to standard operating procedures and regular monitoring of the internal quality control results produced need to be applied in all diagnostic laboratories, leading to laboratory accreditation. The Workshop was a first step towards this objective and will be followed by more training on these subjects.

### **FAO/IAEA Regional Training Course on “The Diagnosis and Control of Foot-and-Mouth Disease” (RAS/5/033)**

Technical Officer: John Crowther

The Training Course took place from 1 to 26 November 1999 at the Foot-and-Mouth Disease Centre, Pakchong, Nakhonratchasima, Thailand.

The four-week course provided practical and theoretical instruction on laboratory methods to detect and differentiate foot-and-mouth disease (FMD) viruses and antibodies against the viruses. These included the sandwich ELISA, the liquid phase blocking ELISA and several forms of ELISA using non-structural

proteins of FMDV to allow discrimination of vaccinated from infected animals. Use of the PCR technologies and sequencing was also demonstrated to allow diagnosis and epidemiological assessment of FMDV strains. The fundamentals of vaccination and control of FMD were examined as well as epidemiological aspects of the disease from a South East Asian and world-wide perspective. Good laboratory practice (GLP), external quality assurance (EQA) and internal quality control (IQC) were also stressed.

### **Task Force Meeting on “Training of Artificial Insemination (AI) Technicians, Field Assessment of Fertility and Database Management” (RAF/5/036; AFRA II-24)**

Technical Officer: Oswin Perera

This meeting was held from 22 to 26 November 1999 at the Taurus Stock Improvement Co-operative, Pretoria, South Africa. It was supported by an IAEA expert (Dr. David Galloway, Australia) and the Technical Officer.

The background to this meeting was the premise that a crucial factor in improving the fertility of cattle bred by AI is the proficiency with which AI technicians perform their duties. This in turn is dependant on several factors, including their training, on-the-job experience on a continuing basis and incentives for maintaining optimum performance.

The specific objectives of the meeting were to:

- Review the programmes and protocols currently in use for training of AI technicians in AFRA Member States and selected countries in other regions;
- Identify ways of improving the

contribution and commitment of AI technicians to provision of more effective breeding and other support services to cattle farmers, including the needs for continuing education;

- Develop a unified and regionally acceptable programme for the training of AI technicians for their effective contribution to the improvement of AI services and development of livestock production in the African region; and
- Identify the basic requirements of a database management system for recording, analysing and reporting field and laboratory data which would facilitate the use of progesterone RIA, in conjunction with AI services, for improving reproductive management by farmers and for providing a service for early diagnosis of non-pregnancy and infertility in cattle.

A full report will be included in the next Newsletter.

#### **D. STATUS OF EXISTING CO-ORDINATED RESEARCH PROJECTS**

### **Use of Nuclear and Colorimetric Techniques for Measuring Microbial Protein Supply from Local Feed Resources in Ruminant Animals (D3.10.21)**

Technical Officer: Harinder Makkar

This CRP is now in its second Phase. It has six new Research Contracts and two Research Agreements making in all nine Research Contract holders and six Research Agreement holders. The CRP is aimed at developing a method which can readily be used by farmer advisors or extension workers to identify major problems of nutrition that result in a grossly inefficient rumen digestion of feed and a low level of microbial supply to the host

animal. The next RCM will be held from 20 to 24 March 2000 at the University Putra Malaysia, Selangor, Malaysia, to assess the progress of the work conducted and to develop procedure(s) to assess the impact of the techniques developed.

A document describing the procedures to ensure quality assurance of analysis being conducted under this CRP will be available in the home page of the Sub-programme early in 2000.

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**Use of Nuclear and Related Techniques to Develop Simple Tannin Assays for Predicting and Improving the Safety and Efficiency of Feeding Ruminants on Tanniferous Tree Foliage (D3.10.22)**

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Technical Officer: Harinder Makkar

This CRP has six Research Contracts, one Technical Contract and three Research Agreements. The Research Contract holders were provided training on tannin assays from 23 August to 24 September 1999 at the Institute for Animal Production in the Tropics

and Sub-tropics, University of Hohenheim, Stuttgart, Germany.

a document describing the procedures required to ensure quality assurance of in sacco nylon bag technique and an FAO/IAEA Working Manual on quantification of tannins will be available in the home page of the Sub-programme early in 2000.

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**To Improve the Effectiveness of Monitoring Trypanosomosis and Tsetse Control Programmes in Africa Using Immunoassay and Parasitological Techniques (D3.20.13)**

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Technical Officer: Ron Dwinger

The final RCM took place from 6 to 10 September 1999 in Addis Ababa, Ethiopia

(See 'Past Events' for more details). The results will be published as an IAEA TECDOC later in 2000.

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**Rinderpest Sero-monitoring and Surveillance in Africa Using Immunoassay Technologies (D3.20.16)**

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Technical Officer: Andrea Gervelmeyer

This CRP has twenty Research Contracts and two Research Agreements. The research focuses on the use of the FAO/IAEA rinderpest ELISA for the surveillance of rinderpest through surveys and active disease research.

This EU funded CRP conducted as part of the OAU/IBAR PARC programme will cease in 2000. It is hoped that one further award of Research Contracts can be achieved with the remaining funds.

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**To Develop and Validate Standardized Methods for Using Polymerase Chain Reaction (PCR) and Related Molecular Technologies for Rapid and Improved Animal Disease Diagnosis (D3.20.17)**

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Technical Officer: John Crowther

Following the recommendations of the RCM in February 1999, the CRP is concentrating on evolving an "Agreed Protocol" for performance of the PCR for the detection of rinderpest, peste-des-petits ruminants (PPR)

and Contagious Bovine Pleuropneumonia (CBPP). The development of primers sets for differential diagnosis of rinderpest-like diseases is also being made to allow identification of viruses where rinderpest is ruled out.

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**The Monitoring of Contagious Bovine Pleuropneumonia in Africa Using Enzyme Immunoassays (D3.20.18)**

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Technical Officer: Andrea Gervelmeyer

This CRP has eleven Research Contracts and three Research Agreements. The main objective of the CRP is to validate,

standardize and utilize the competitive ELISA for the detection of antibodies to contagious bovine pleuropneumonia (CBPP) through field studies in different African countries. The second RCM was held from 27 September to

1 October 1999 in Lusaka, Zambia (see also

under Past Events).

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**Assessment of the Effectiveness of Vaccination Strategies against Newcastle Disease and Gumboro Disease Using Immunoassay-based Technologies for Increasing Farmyard Poultry Production in Africa (D3.20.19)**

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Technical Officer: Ron Dwinger

All Research Contract holders (RCH) used a detailed standardized questionnaire for collecting base line data on family poultry production following the guidelines prepared during the first RCM. The guidelines stipulated the need to collect data from 24 different family poultry farms (two different ecological zones; three villages in each zone; four farmers in each village). The farms were visited during the rainy season and flock data, serum and faecal samples were collected. The data were entered in a spreadsheet in order to facilitate analysis. Each RCH analysed the data and prepared a report. During the analysis particular emphasis was placed on determining factors constraining family poultry productivity in each ecological zone. In addition, the RCH sent the first data set to Vienna for an analysis to detect between-country comparisons and differences.

The same farms will be visited a second time during the wet season, while data on sick and dead birds will be collected in a continuous fashion. Following the collection of baseline data, will be the introduction of interventions on the selected farms in order to improve productivity as measured by number of eggs produced, number of chicks reaching adulthood and number of animals sold. Interventions will consist of providing one or more of the following measures depending on local conditions and the factors limiting production: vaccination, disease prevention, supplementary feeding, simple housing structures and marketing improvements.

The second data set (of the alternate season) should be sent to Vienna before April 2000 in order to enable the completion of the between-country analysis before the next RCM in Morogoro, Tanzania, in September 2000.

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**The Use of Non-structural Protein of Foot-and-Mouth Disease Virus (FMDV) to Differentiate between Vaccinated and Infected Animals (D3.20.20)**

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Technical Officer: John Crowther

The CRP has fifteen Research Contract holders and six Research Agreement holders. Three Technical Contracts to supply reagents have been fulfilled. These involve indirect ELISAs using expressed 3ABC (Pirbright and Brescia Laboratories), individual synthesized peptides from 3A and 3B (United Biomedical incorporated, UBI) and a competitive ELISA using 3AB and hyper immune guinea pig sera.

Equipment and reagents have been supplied to all Research Contract holders to supplement the assays. A questionnaire dealing with the sera available for study and possible experimental protocols to develop serum panels has been received from 10 out of 15 Research Contract holders. The first Research Co-ordination meeting is being planned in March 2000 in Rio de Janeiro.

## E. NEW CO-ORDINATED RESEARCH PROJECTS

### Application of PCR-ELISA for the Diagnosis and Control of Animal Trypanosomosis

Technical Officer: Ron Dwinger

#### **Introduction:**

Traditionally trypanosomosis in animals has been diagnosed by laborious microscopic examination of individual blood samples, initially thin and thick Giemsa stained smears, later wet films. Concentration methods were developed in the seventies using a haematocrit centrifuge. As a result, the diagnosis of the disease was improved and more animals were detected to be infected with trypanosomes. These techniques, the Woo method and the buffy coat technique (BCT) had as an additional advantage that the anaemia of the animal could be assessed simultaneously by measuring the packed red cell volume percentage. However, although the specificity of the techniques was good (very few false positives were encountered), the sensitivity was insufficient. The lower detection limit of the most sensitive technique (the BCT) was reported to be between 100 and 1000 trypanosomes/ml blood. This proved to be insufficient since trypanosomosis in cattle is often encountered under field conditions as a chronic disease with low levels of circulating parasites in the blood.

The discovery of monoclonal antibodies and the use of ELISA technology provided an additional diagnostic tool for testing large numbers of samples with a reasonable accuracy of detecting infected animals. Although initial results using the antigen-detection ELISA were promising, it soon became apparent that many infections were missed (false negatives) and that even false positive results were not uncommon. Moreover, under experimental conditions it was found that the antigen-detection ELISA was not any better in diagnosing infected animals than the BCT. In other words, the test not only failed to detect animals with a low amount of circulating antigen during the initial (subacute) phase of infection, but also was not able to detect parasites during later stages of the disease due to the formation of immune complexes masking the antigenic determinants

recognized by the monoclonal antibodies used in the test.

#### **Rationale:**

Consequently, it became necessary to develop a new set of test reagents and a new format of testing. A combination of ELISA and novel molecular techniques such as the polymerase chain reaction (PCR) might be the answer to the need for a reliable and accurate diagnosis of the disease.

The PCR is known to be a very sensitive test. For trypanosomosis in particular, this test would be ideally suited as the "gold standard". It would have to verify doubtful samples which have been detected positive by ELISA, but have not been found positive parasitologically in order to distinguish the true from the false positives. At the same time, it would be useful if the PCR technique could be employed to detect infected animals that have tested negative in the ELISA and BCT due to insufficient sensitivity of these latter two tests (in other words to detect the false negatives). However, it should be noted that the PCR technique will show false positives if insufficient controls are being used during the sampling and testing procedures.

Consequently, a test combining the properties of PCR and ELISA and including sufficient controls might provide the correct diagnostic results. The proposed CRP intends to develop and validate a PCR in combination with an ELISA format. The practical significance of such a test would be in disease eradication programmes. In such cases, it is of great importance to detect remaining foci of infection (to detect the false negatives). It is equally important to unmask the false positives which would assist in indicating when to stop eradication efforts.

#### **Overall objective:**

To improve livestock production through effective control/eradication of livestock diseases.

**Specific objective:**

To introduce a molecular biological technique (PCR–ELISA) for a more effective diagnosis and surveillance of trypanosomes in cattle.

**Expected research outputs:**

- Development of a PCR–ELISA to detect trypanosomal DNA.
- Modification of the technique to an easy-to-use format, which can handle large numbers of samples (PCR–ELISA).
- Application of a more sensitive diagnostic technique with the result that a larger number of animals can be identified as infected and, subsequently, can be treated with trypanocidal drugs.
- Improved monitoring of control programmes or eradication campaigns using more sensitive detection techniques, which will result in a correct identification of animals no longer infected with parasites.

**Proposals:**

Scientists working in countries in Africa, Latin America and Asia where trypanosomosis is a serious problem for the livestock industry are requested to submit research proposals using the appropriate forms (“Research Contract Proposal”).

Only those institutes should apply for participation in the new CRP with already sufficient laboratory equipment and capability in the areas of ELISA and PCR technology.

Proposals should describe the experimental design (for example number of samples, number of animals, geographical area, parameters, sampling techniques, experimental animals, etc.) of the validation and application of the PCR–ELISA. In addition, the expected output and benefits (for the laboratory, the farmers and the country) should be indicated.

It should be noted that funds do not currently exist for the support of this CRP, but are being actively sought from extrabudgetary resources.

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**Molecular Antigenic Variation in African Swine Fever Virus**

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Technical Officer: John Crowther

The specific objectives of this CRP will be to develop molecular and serological methods for the diagnosis and characterisation of strains of African swine fever virus.

African swine fever (ASF) is a complex virus causing a devastating disease in pigs in Africa, against which there is no vaccine. The disease is spread by contact, contamination and by vectors. Other wild pigs species also maintain the disease, since they carry the virus without symptoms and can infect domestic pigs. A variety of methods have been devised for the diagnosis and surveillance of the disease through detection of antigens and antibodies, but a major problem is the lack of standardization of methods, and supply of reagents. Coupled with this is a poor general understanding of the relevance of the tests, even those regarded as being well established, and when to use them. The newer technologies of PCR probe analysis and sequencing have not been fully exploited. The CRP will develop practical molecular biological tools to

allow confirmation of diagnosis and allow amplification of gene products and sequencing, as well as develop serological techniques based on monoclonal antibodies. The PCR methods will allow confidence that the virus genome is absent, following control programmes, the rapid assessment of strains and major increase of the molecular epidemiological understanding of the spread of virus and also the indigenous strains in countries. This will require examination of primers and the best (most appropriate) systems of PCR and establishment of monoclonal antibody banks which can be used in a number of laboratories in Africa. It will also require efficient methods for data base preparation and agreement on methods of analysis of results to allow epidemiological significance of data to be assessed. Such methods will be compared with serological techniques developed utilizing existing monoclonal antibodies for both direct diagnosis and strain characterization at the antigenic level. A network of laboratories receiving and analysing samples will be set up

with agreed protocols and analytical methods, communicating data to all parties interested in ASF control. This will lead to more effective control and eventual eradication of disease and provide methods to allow confidence that disease is absent after control programmes, by examination of wild life and vectors. The introduction and standardisation of such technologies will result in greater understanding of movement of ASF within and between countries in Africa, leading to development of better control strategies. The CRP will develop and validate improved technologies based on molecular methods for diagnosis of virus and strain differentiation. The CRP will also act as a focus for all African laboratories in the supply of strains for characterization (catalytic). This will be

the first time that active sequencing of the strains was made in Africa under African conditions. The parallel serological investigations will also lead to a better understanding of the relationship between antigenicity and sequence variation. The overall impact will be on effective and sustained control of ASF in Africa.

Applications for participation in the CRP should come from laboratories where ASF is relevant and where facilities are of sufficient standard.

It is expected that this new CRP will commence at the beginning of 2001 and applications should be sent as soon as possible.

### **The Development of Strategies for the Effective Monitoring of Veterinary Drug Residues in Livestock and Livestock Products in Developing Countries**

Technical Officer: Martyn Jeggo

It has been decided to carefully review the activities to be undertaken under this CRP to ensure that it is in line with the rapidly changing needs and opportunities in this area

of food quality monitoring. All those submitting proposals have been informed accordingly and a re-evaluation of submitted proposals will be undertaken in the coming months.

### **Methodologies for Demonstrating Increases in the Productivity of Peri-Urban Dairy Cattle Using an Integrated Approach to Improving Nutrition, Reproductive Management and Disease Control**

Technical Officer: Oswin Perera

#### **Background:**

Previous studies conducted under the Joint FAO/IAEA Sub-programme on animal production and health in a variety of ruminant farming systems in developing countries had clearly identified three areas, in which major constraints existed for the improvement of dairy production. These are poor nutrition, inadequate reproductive management and prevalence of concurrent disease. However, since these initiatives focused on only one constraint at a time, other concurrent production problems limited the economic benefit and failed to show the farmer the real gains that could be made. This in turn resulted in a failure of uptake of good ideas for supplementary feeding, or for improving reproductive performance, not because the approach was wrong, but because the impact

was not obvious to farmers. Thus the need has arisen for the development of a multi-disciplinary or integrated approach, which will tackle the major constraints together in any one locality and be able to generate evidence showing real economic advantage. This in turn should result in an uptake of these effective interventions at the farmer level. In considering how best to approach this issue, the model chosen to demonstrate the effectiveness of this strategy needs to be one that can have a real economic impact, which can be easily realised and is likely to be sustainable. The peri-urban dairying industry is usually based on real income generation and has a ready market at hand, based on a visible commodity (milk, butter and cheese) and thus, would fulfil these prerequisites.

A new CRP is being developed to show that an integrated systems approach can be more

cost effective, than the tackling of one constraint alone. The programme will also serve as a vehicle to develop a collaborative approach among scientists, extension personnel and dairy farmers, as well as to improve the herd health and productivity management skills of farmers. This would be accomplished through tackling the three core factors (better nutrition and reproductive management, and control of clinical or sub-clinical diseases). For any given location the intervention strategy will be different, based on the constraints which are operating, and will focus on the use of locally available resources. The success will clearly rest on a demonstration of the benefits accruing from the interventions, but central to this CRP will be the development of a standardized accounting system to document interventions, costs and benefits.

**Objectives:**

The main objectives are to (1) determine the most important limiting factors in specific selected dairy production systems, (2) customize intervention strategies in an integrated manner and (3) clearly demonstrate through cost benefit analysis that this multi-disciplinary approach is superior to dealing with only one constraint.

**Strategy:**

The CRP will consist of the following successive phases of activity:

*Preparatory Phase* – To be undertaken by potential participants prior to submission of a Research Contract proposal. This will involve the formation of multidisciplinary teams (nutrition, reproduction, disease diagnosis, extension and economics), selection of a target dairy production system (small-scale commercial, peri-urban), conduct of a preliminary literature survey and the conduct of a rapid rural appraisal (RRA) among the target farmers using a core questionnaire which will be supplied by the Animal Production and Health Section.

*CRP Phase I: diagnostic survey* - Conduct a one year diagnostic investigation in selected farms, using a questionnaire which will be customized for each situation, to fully identify and characterize the nature and extent, as well as relative importance of major constraints. The process of identifying constraints will

also include laboratory analyses in the areas of nutrition, reproductive performance and disease diagnosis. This investigation should be based on the principles of participatory rural appraisal (PRA), and include individual interactions and group activities where the investigator is a facilitator and the farmers themselves identify the problems and propose corrective measures which are achievable with available resources.

*CRP Phase II: intervention(s)* - Development and implementation of an integrated intervention strategy during the second and third year, based on the findings of the survey and on a partnership basis with all stakeholders. The final two years will focus on the documentation of cost of the interventions and the benefits that accrue in terms of increased output and earnings, and the development of methodologies including data handling and evaluation procedures for larger scale application of this strategy by national authorities, farmer organizations and industry.

**Requirements:**

In order to be eligible to participate in this CRP, institutes in Member States must have the capability to assemble a multi-disciplinary team of scientists (including an animal scientist, veterinarian, livestock economist and extension specialist) and have access to good laboratory facilities in nutrition (including chemical feed analysis, rumen cannulated animals; *in sacco* nylon bag or *in vitro* gas production technique), reproduction (including RIA for progesterone in milk using <sup>125</sup>Iodine as tracer) and disease diagnosis (including haematology, faecal examination, mastitis tests, and ELISA for serology). They must also have good transport and other facilities for field work, capability for computer-based data recording and analysis, access to e-mail links and sufficient resources of their own to complete the requirements of the preparatory phase outlined above.

During the preparation of the project proposal, the project team in each country must establish demonstrable links with national livestock development authorities and AI service providers and customize their project to fit into on-going development efforts. They must work closely with farmer organizations and the farmers themselves in the target

farming system in obtaining the background information necessary for project formulation.

**Scientific scope and operational aspects:**

These are currently being developed in consultation with international experts in the

relevant fields of activity. Institutes and scientists interested in submitting proposals will be provided with the full project document during the first half of 2000.

**General information applicable to all Co-ordinated Research Projects**

**Submission of Proposals**

Research Contract proposal forms can be obtained from IAEA, National Atomic Energy Commissions and UNDP offices. Such proposals need to be countersigned by the Head of the Institution and sent directly to the IAEA. They do not need to be routed through other official channels unless local regulations require otherwise.

**Complementary FAO/IAEA Support**

IAEA has a programme of support through national IAEA Technical Co-operation Projects

(TCP). These are concerned with aspects of animal production and diagnosis of animal diseases. Through such projects, additional support may be provided for the activities planned under the individual Research Contracts. This would provide further equipment, specialized training through IAEA training fellowships and the provision of technical back-stopping through visits by IAEA experts for periods of up to 1 month. Such support would be available to IAEA Member States.

**F. RINDERPEST UPDATE**

I thought it useful and appropriate as this year comes to a close, to update you on the current status of our support for the global eradication of rinderpest. In doing this, I have focused on the Sub-programme's perspective, looking at what we have done and will hopefully be able to do in the future to support your activities. Our focus is, as it has always been, on the laboratory aspects of the rinderpest eradication programme. Of course you will know that throughout we have aligned all our support with that of FAO GREP (Global Eradication of Rinderpest Programme) and taken the lead from them on the more substantive issues. We have also worked closely with regional (e.g. Pan African Rinderpest Campaign, PARC) and national efforts to ensure a synergy with resources available through these efforts.

For the past 14 years the Joint FAO/IAEA Division and the IAEA Technical Co-operation Programmes have concentrated support on providing resources to develop a capability of laboratories in Africa and more recently, in Asia to assist national rinderpest

control and eradication programmes. This support has been provided through the award of individual research contracts under an FAO/IAEA Co-ordinated Research Project in Africa, through national IAEA Technical Co-operation Projects and through regional IAEA Technical Co-operation Projects. Whilst originally the focus was on the development, validation and assistance for the routine use of ELISA for monitoring the effectiveness of national vaccination programmes, it progressed to support of surveillance of rinderpest. This includes not only using an ELISA but also PCR in some laboratories, the development and use of performance indicators for rinderpest surveillance, assistance with documentation for the OIE and most importantly the development and introduction of a range of quality assurance activities.

I would also like to draw you attention to the following articles in this Newsletter; a rinderpest meeting held in Syria, which identified both what has been achieved and what the focus should be for the future; a

meeting held in Senegal on quality assurance for the rinderpest ELISA; and proposed meetings in Vienna early next year on rinderpest lineage 2 virus, and in Pakistan focusing on rinderpest activities in this country.

In Africa, PARC was completed some two months ago. The new follow-on EU-funded Project PACE (Pan African Control of Epizootics) is destined to start soon and under this project there will be support for the completion of rinderpest eradication. However, be aware that rinderpest is not the only focus of PACE. We have been assured by those involved in preparing the national PACE projects that adequate resources have been earmarked in these national plans for national laboratories and their envisaged role in supporting national PACE activities. It is vital that those of you in national laboratories in Africa are not only aware of this, but ensure that your laboratory does receive this support under your national PACE Project for your rinderpest (or other diseases) diagnostic activities. Whilst there is a strong epidemiology component within the PACE sub-project dealing with regional support, there is no financial support for laboratory activities in the regional component of pace. You will have to seek this within your separate/specific national projects.

The FAO/IAEA Co-ordinated Research Project as operating under PARC for the past 10 years is now drawing rapidly to a close and will not be continued through PACE. Whilst it might be possible to provide for one more research contract award, even this is far from certain. There will be no more annual FAO/IAEA/IBAR Research Co-ordination Meetings for rinderpest (although support will, however, continue for Co-ordinated Research Projects on CBPP and also in 2001 for African Swine Fever). The IAEA and OAU/IBAR have however, signed an agreement under which the IAEA Technical Co-operation Programme will provide support to PACE. The level of this support and the range of activities that it will encompass has yet to be delineated, but it will include funds for an annual meeting or workshop, expert missions to assist you with difficult tasks and fellowship training. Furthermore, it will have

as one major priority, the development of a capability within the region to produce and distribute diagnostic kits for the PACE diseases starting with rinderpest.

This brings me to discuss in slightly more detail our recent support for the development of a diagnostic reagent production and distribution capability within the region. Many African scientists have asked if it would be possible to produce such kits in Africa. To try and meet this request we have embarked on a process of trying to validate and then produce locally a rinderpest ELISA kit based on baculovirus-expressed rinderpest antigen (N-protein). We are working with national laboratories in Kenya, Senegal and Côte D'Ivoire and in close co-operation with the group led by Professor Yilma at the University of California. At present the focus is on the international validation of the assay through a comparison with the current Pirbright-produced competitive ELISA with subsequent submission of trial results to OIE for recognition of the assay. The second phase will be the development of the capacity for reagent production, assembly and distribution in a quality assured manner and on cost recovery basis, before a third step, when the project will broaden to encompass other African laboratories and other livestock diseases of importance in Africa. Support for most of this work is being provided through a US Government funded Footnote A IAEA Technical Co-operation Project.

Linked to this, but not directly part of this activity is the issue with lineage 2 rinderpest virus. We are all aware that in East Africa there appears to be a new rinderpest virus variant that is often mild in appearance and leads to the development of antibodies that are not as well detected by the current cELISA as antibodies to lineage 1 virus. We have been in dialogue with CIRAD/EMVT, Pirbright Laboratories and the FAO rinderpest reference laboratory in Kenya, investigating the extent of the problem and possible solutions. In late January, we will be holding a FAO/IAEA consultants meeting here in Vienna to discuss this matter further and seek full resolution of the diagnostic problems with this lineage 2 variant of rinderpest virus.

In terms of Asia, we have a number of national TC Projects on-going and it is hoped to provide TC support to Pakistan in the near future. We have also planned a meeting in Pakistan in 2000 to further consolidate and plan activities for rinderpest surveillance in and around Pakistan.

I would like to end on an upbeat note. Rinderpest has almost gone! It exists in only four or five countries in the world and the FAO Global Rinderpest Eradication

Programme is on target for the final eradication date of 2010. But the efforts must continue to finally complete the process. We must not get side-tracked. In Africa with the completion of PARC and the start of PACE a new era is starting and the transition may not always be smooth. In Asia other factors can easily divert national attention. But we in this Sub-programme are firmly committed to assist the final eradication of rinderpest from the globe and we will do all we can to assist you.

## **G. QUALITY ASSURANCE PROGRAMMES**

### **Résumé of EQA rounds with the RIA for the determination of progesterone in milk and serum /plasma samples**

The 22<sup>nd</sup> External Quality Control (EQC) exercise for progesterone RIA, which is a component of the FAO/IAEA External Quality Assurance Programme (EQAP), has recently been concluded. EQC samples for milk progesterone determinations were distributed to 19 laboratories, and for plasma/serum determinations to 12 laboratories.

Results were returned by 12 (63%) laboratories that processed milk samples and 7 (58%) laboratories that processed plasma/serum samples. There was only one laboratory which reported a result outside acceptable limits for the milk assay, while all results reported for the plasma/serum assay were within acceptable limits.

The response rate for this round of EQC was higher than that for previous rounds. The 23<sup>rd</sup> EQC exercise for milk and plasma has been scheduled for February/March 2000 and will include both DPC and ScRIA kits.

#### **Reports:**

The External Quality Assurance Programme for the FAO/IAEA/P4-21 Exercise, for the determination of progesterone in skim milk and plasma of farm livestock, Report (EQAP/November 1998) M. Khadra, O. Perera and A. Colling.

The External Quality Assurance Programme for the FAO/IAEA/P4-20 Exercise, for the

determination of progesterone in skim milk and plasma of farm livestock, Report (EQAP/May 1998). M. BenKhadra, O. Perera, and A. Colling.

### **Résumé of EQA rounds with FAO/IAEA ELISAs**

Thirty-two laboratories participated in the fifth EQA round with the indirect FAO/IAEA brucellosis ELISA. Twenty-two laboratories confirmed the receipt of the panel, 16 laboratories returned updated/new information regarding the questionnaire, 13 laboratories returned IQC data and 16 laboratories returned results concerning the EQC test panel. With regard to the EQC test panel, 100% of agreement was achieved for samples 1, 2, 3 and 5 and 93% of agreement was achieved for sample 4, when a common cut-off of 15% was applied, resulting in an overall agreement of 99%. When individual cut-offs were applied, an overall agreement of 95% was obtained after exclusion of sample 4.

Five laboratories qualified as “provisionally recognized” and seven laboratories qualified as “recognized”. The latter received a certificate of recognition together with the interim report.

Some laboratories informed about low OD values for the IQC sera (C++ and C+). These laboratories were supplied with fresh reagents.

It is recognized and appreciated that more and more laboratories have started to produce their own IQC monitoring charts, which they send

electronically to the TO or EQA co-ordinator (e.g. as Excel file e-mail attachment).

Report: “The external quality assurance programme for use with the FAO/IAEA indirect Brucellosis ELISA, Interim Report EQA/BRA/1998B.”

Thirty-one laboratories participated in the sixth EQA round with the indirect FAO/IAEA brucellosis ELISA. Twenty-six laboratories confirmed the receipt of the panel, 18 laboratories returned updated/new information regarding the questionnaire, 16 laboratories returned IQC data and 20 laboratories returned results concerning the EQC test panel.

The overall response for this round is considerably higher than for the last round. This may be related to the fact that this time the EQA co-ordinator has given a delayed deadline for a number of “latecomers” who have given the reason for being late. Results are being analyzed and will be published in a comprehensive interim report soon.

Report: “The external quality assurance programme for use with the FAO/IAEA indirect Brucellosis ELISA, Interim Report EQA/BRA/1999A” in preparation.

#### Lessons learned

A total of 14 EQA rounds with FAO/IAEA ELISAs have been performed between 1995 and 1999, and the results represent a learning process for both the counterparts and the Sub-programme staff.

The major emphasis of the FAO/IAEA EQAP has been on proficiency testing. Information derived from the questionnaire and analysis of reported Internal Quality Control (IQC) data have represented adjuncts to a core programme of unknown sample analysis, but the criteria for “Recognition”, as specified by the 1994 Consultants’ Report, did not include specific requirements for quality management (QM) or laboratory performance with respect to assay control and IQC data analysis and documentation. Rather, general attention to improvement and documentation in these areas was encouraged, but the primary measure of successful EQAP participation for “Recognition” was correct identification of the unknown samples of the proficiency test panel.

It has become clear that the strong correlation between proficiency testing and programmatic “Recognition” is inappropriate. It has been observed that performance on an annual or biannual proficiency test panel does not necessarily provide an accurate picture of the day-to-day quality of operations of the counterpart’s laboratory. Additionally, many of the laboratories have not complied with the requirements to provide updated QM information or recent IQC data with each proficiency test round because they did not understand the benefits to be gained from this exercise or did not consider these to be important elements of the FAO/IAEA EQAP.

To remedy this situation, the following revised definitions and criteria for “FAO/IAEA Recognition” have been developed:

#### *Definitions of FAO/IAEA Recognition*

FAO/IAEA **Recognition is programmatic** in nature and given **retrospectively** for a defined period of time. It is explicit recognition of an FAO/IAEA Co-ordinated Research Project (CRP) or Technical Co-operation Project (TCP) Counterpart’s success in meeting FAO/IAEA criteria for good laboratory QM and operations (see criteria below), as well as successful participation in regular proficiency tests for specific FAO/IAEA animal disease ELISAs.

FAO/IAEA **Recognition does not constitute certification, accreditation, or recognition of compliance** as defined by the International Standards Organization (ISO), the Organization for Economic Co-operation and Development (OECD), or similar international, regional, or national organizations. In addition, it is not an explicit guarantee of a laboratory’s future performance.

#### *Criteria for FAO/IAEA Recognition*

Currently, FAO/IAEA Recognition can be extended only to those laboratories that have current or recent FAO/IAEA or IAEA project involvement and those that voluntarily subscribe to the criteria of the FAO/IAEA EQAP, the latter on a case-by-case basis as resources permit.

The criteria that must be fulfilled to achieve FAO/IAEA Recognition are as follows:

- a) Provide evidence of a QM system including
- a **quality manual** including, as a minimum, a statement of laboratory mission, a description of the laboratory organization, staff qualifications, general operational and laboratory procedures, safety procedures, standard operating procedures for routine assays, and work instructions for routine procedures.
  - **documentation of quality control procedures** including inventory controls, equipment calibration checks, and approved work plans for non-routine activities.
- b) Provide **evidence of the maintenance of assay control** including
- **routine use of IQC samples**, where appropriate;
  - routine use of **control charts**, where appropriate;
  - routine use of **standard curves**, where appropriate;
  - **maintenance of documentation** for all controls.
- c) **Participate** regularly and successfully in **FAO/IAEA proficiency test rounds**
- **respond to questionnaire/update**
  - **supply IQC data electronically and/or in control chart form**
  - **correctly interpret unknown samples within pre-established limits.**

To assist in the routine use of IQC data, to provide feedback and support and to allow effective evaluation of data it is strongly urged that all counterparts establish a weekly e-mail link with their TO in the Sub-programme. Through this link they can send their weekly IQC data, which can then be further checked by the TO and appropriate support and advice given. This approach has been on-going for some time with these involved in the CRP on trypanosomosis and has proved immensely useful in assisting counterpart routinely use ELISA based systems.

#### ***Monitoring and evaluation***

The FAO/IAEA EQAP assists participants in the **development of a QM system** and the **use and documentation of IQC data. Standard**

**formats** for the presentation of this information are supplied and their use is encouraged (see Newsletter No. 30, 29 and 27). Once the **QA elements** are in place and in use, **provision of evidence** to meet criteria as quoted above is generated **by the counterpart** on a regular basis, but no less than once per year, to achieve or maintain “Recognition” status (see below).

The evidence to meet criteria above can be provided through a number of mechanisms. It may be **communicated by e-mail, fax, or post** in a timely manner to the **EQAP Co-ordinator or relevant FAO/IAEA Technical Officer**. It can be made available to any FAO/IAEA Technical Officer during official visits to the counterpart laboratory.

#### ***EQAP status***

Participation in the FAO/IAEA EQAP is on a **confidential basis, comprehensive reports** being issued on an anonymous basis with respect to the participants, and the Recognition status of any participant is disclosed only with the permission of the participant.

“FAO/IAEA Recognition” is awarded following the verification by the FAO/IAEA EQAP Co-ordinator of **compliance with criteria above** plus successful participation in two proficiency test rounds, if available. Continued participation results in continued “Recognition”. Lack of participation results in a “Recognized laboratory” losing the opportunity to maintain that status.

Because a major objective of this programme is to assist veterinary diagnostic testing laboratories in developing countries to improve their performance and reliability, the primary focus is to help counterpart laboratories establish credible QM and operating systems and establish sustainable proficiency in the application of FAO/IAEA diagnostic assays and to provide a bridge between the current level of their quality system and formal certification or accreditation to internationally-accepted standards. Therefore, the unique problems facing these laboratories and any other extenuating circumstances affecting a laboratory’s performance and status in this

programme are considered on a case-by-case basis.

### **Background rationale for new EQAP “Recognition” criteria**

In February 1998, an FAO/IAEA consultants meeting was convened to consider the design, impact, and proposals for future implementation of the current FAO/IAEA EQAP for animal disease diagnosis and make recommendations with regard to its central purposes and future direction. In addition, the consultants considered the broader question of a generic accreditation scheme for veterinary diagnostic testing laboratories that could be made available through international, regional, or national organizations as appropriate to the country of interest. This broader discussion was stimulated by the fact that few developed and developing countries have nationally organized schemes to measure and recognize the quality systems and technical competence of veterinary diagnostic laboratories, but that such a scheme is of vital importance to the quality of policy decisions and actions taken on national animal health issues and the international trade of livestock and livestock commodities. It followed, that in the Subprogramme’s role as a Collaborating Centre to the Office International des Epizooties (OIE, or World Animal Health Organization), it would be appropriate to consider the FAO/IAEA EQAP within the broader scope of an international scheme for veterinary diagnostic laboratory accreditation for two reasons. Firstly, to use information learned through the design and implementation of the FAO/IAEA EQAP to assist in the appropriate development of an international scheme and secondly, to ensure that the FAO/IAEA EQAP objectives and processes are in harmony with international standards and guidelines as they develop in this area.

The primary activity of a veterinary diagnostic laboratory is to perform tests on biological samples. Properly conducted validation studies of routine assays, documentation of assay controls, and other QA elements are critical to these activities. However, some of the metrological principles of the physical

sciences embodied in ISO/IEC Guide 25 are not directly relevant or applicable to veterinary diagnostic laboratories and efforts to comply with the interpretations of these principles can lead to substantial expenses of time and money without adding significantly to the QA effort. Similarly, the study-oriented approach of the OECD-GLP does not lend itself to evaluating the QM, general operations, or technical competence of a veterinary diagnostic laboratory. Essentially, a veterinary diagnostic laboratory accreditation scheme based on either ISO 25 or OECD-GLP alone would either be too costly for the benefits obtained and/or not provide fully appropriate assurances of good quality management or technical competence to regulatory officials or trading partners for the range of activities conducted in this type of laboratory. Therefore, one practical route to development of an accreditation scheme for veterinary diagnostic testing laboratories could be (1) to define the needs of the customers (primarily the national regulatory authorities and trading partners) with respect to the operation and output of a laboratory; (2) review ISO Guide 25 and OECD-GLP with an eye towards those management elements that are essential to meeting the needs defined above and which have practical application in veterinary diagnostic laboratories; and (3) define, based on this review, the QM principles and a monitoring process that are appropriate to international, regional, and/or national application. This approach was taken as a prelude to and during the Consultants Meeting.

As a result of the Consultants Meeting, a proposal for an international standard to assess the management and technical status of laboratories conducting tests for infectious animal diseases was submitted to OIE. The current form of this proposal is based on the draft ISO 17025 and is under active consideration by OIE.

If this or a similar proposal is approved by the International Committee of the OIE, it will provide a clear formula for quality systems in veterinary diagnostic laboratories world-wide.

## H. COMPUTER SOFTWARE PROGRAMS

### 1. SID

SID 3.1 has now been supplied to most of those using a previous version of SID. It

provides a computerized basis for linking field data with laboratory test results.

### 2. TADInfo

Under the FAO EMPRES programme, a new software program called TADInfo is being developed for use at the national, regional or global level. This program will be designed to allow those making decisions on disease control or eradication to be better informed through a systematic collection and multiple manipulation of reports on disease occurrence. It is foreseen that such reports will be geo-referenced (either at the point of collection or subsequently centrally) to allow the full use of

GIS (geographical information system) in analysing these reports. A link within this approach is a software program (LABInfo) for tracking laboratory samples from their collection point, to the laboratory for testing and the submission of a final test report (see below).

Driving the TADInfo initiative from FAO Headquarters in Rome is Roger Paskins, and he will work closely with us.

### 3. LABInfo

The Joint FAO/IAEA Division and EMPRES, FAO, have commenced the development of a system to assist laboratories in recording, analysing, interpreting and presenting their data for tracking and managerial purposes. The main objectives of this product, LABInfo, is to assist in daily management of submissions, sample tracking and facilitation

of reporting.

LABINFO is intended to be distributed to national laboratories, as a counterpart of the national animal disease information system, TADInfo, that is currently being developed by FAO and it is hoped that further development work will be undertaken on LABINFO in early 2000.

## I. GEOGRAPHICAL INFORMATION SYSTEMS

A model was designed to identify priority areas for tsetse control in Ethiopia in close co-operation with FAO and a consultant from Ethiopia. Early May, a visit to Bobo Dioulasso, Burkina Faso, was made to discuss with Dr. G. Hendrickx characteristics of a GIS model to prioritize intervention areas for tsetse control for West Africa focusing on the importance of farming system, climate and natural resources and selection of variables.

Also in May, a visit to FAO, Rome, was made to initiate the Ethiopian Tsetse-Agriculture database and model for the demarcation of tsetse/farmland dividing line with a GIS to use as a decision tool for prioritization of areas for tsetse control in Ethiopia, in co-operation with FAO and a consultant from Ethiopia. In

addition, (field) data were collected for expanding the Tsetse-Agriculture database and model. At present, many data layers for this model have been produced (see Fig. 1).

In June, two fellows from Sudan were trained on GIS applications for rinderpest mapping. The fellowship consisted of an intensive two-week GIS course on ArcView at ESRI, South Africa, and a two-week applied rinderpest mapping, digitizing and database analysis course (using the software packages ArcView and Cartalinx) at IAEA, Vienna.

In September, a visit to Ethiopia was made to do initial ground-truthing in Didessa and Gibe valley to validate the GIS data-sets supporting the model to prioritize areas for tsetse control

in Ethiopia, with an emphasis on the DEM (Digital Elevation Model). Secondly, a presentation on the set-up of the model was given at the Final FAO/IAEA RCM entitled “Use of immunoassay methods for improved diagnosis of trypanosomosis and monitoring tsetse and trypanosomosis control programmes” at ILRI, Addis Ababa, Ethiopia. In addition, a one-day demonstration and practical training on DAVID (Disease and Vector Integrated Database) and GPS was given to the fifteen participants of the RCM.

Two consultancy services will take place before the end of the year; one in Ethiopia to collect additional field data at PA level (smallest Admin. level in Ethiopia) to support the model and one in Rome to discuss and set the criteria for the farming system definition for Ethiopia based on the data-layers and the environmental parameters of the model.

Installation of GIS-software and a GPS & data-analysis training in Khartoum, Sudan, as a follow-up of the fellowship training, is planned for early December 1999.

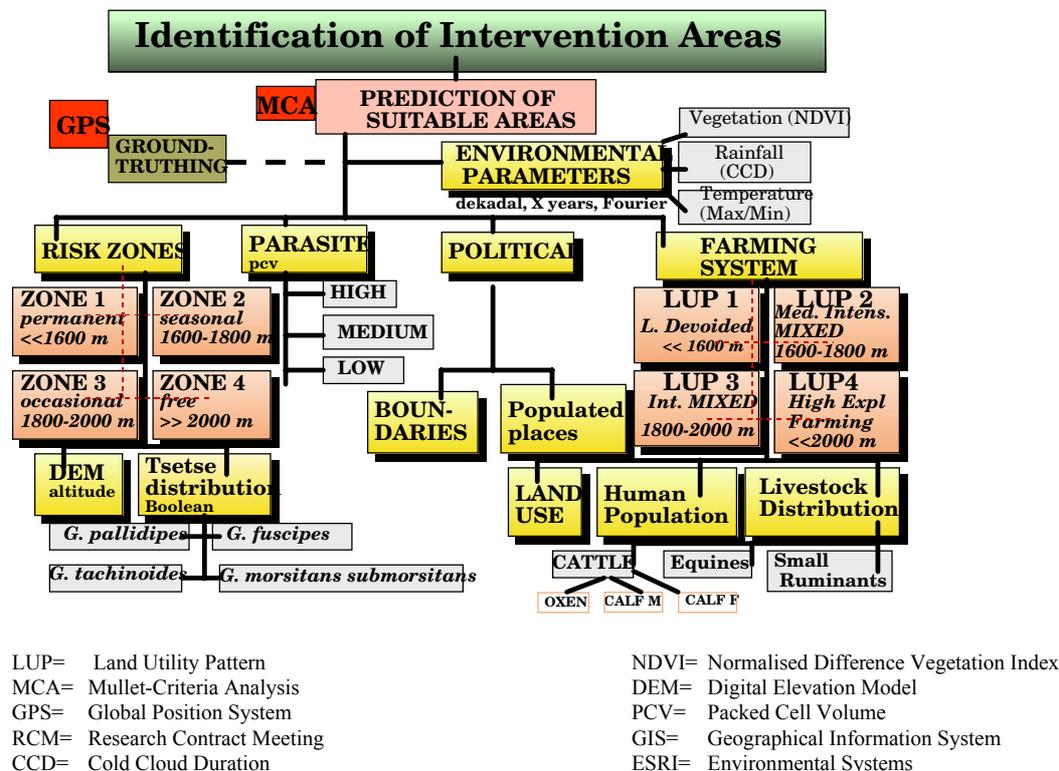


Figure 1: Simplified Set-up of the Ethiopian Model

## J. FUTURE RESEARCH AREAS FOR IMPROVING LIVESTOCK PRODUCTION IN DEVELOPING COUNTRIES USING NUCLEAR TECHNOLOGIES

As part of the process of involving all stakeholders in developing the longer-term strategy for the animal production component of the Sub-programme we are sending a letter out to as many of you as possible. Please find below a copy of the letter and if you do not receive this directly please, if possible take time to complete the questionnaire in this Newsletter and send it back to us.

### Copy of a letter sent to various experts in the field of Animal Production

The Animal Production and Health Sub-Programme of the Joint FAO/IAEA Programme on Nuclear Techniques in Food and Agriculture is in the process of developing a strategic plan for the Animal Production component for the period 2003–2010. As part of this process, the Sub-Programme would like to obtain inputs on the future research

areas/directions from key individuals. We would be grateful for your valuable suggestions and advice on the new research directions on specific areas in the field of Animal Production in developing countries, and where isotopes/nuclear methods can be employed.

We would therefore appreciate very much if you would kindly complete the attached questionnaire and return it at your earliest convenience. Since we will be analysing the responses and using the information for programme design in early January 2000, we should be grateful if you could send this by 15 January 2000.

The names of the individuals supplying these inputs will be placed in our data base which is used for short-term assignment and consultancy. You will also receive our Newsletters and technical documents of the Animal Production and Health Sub-Programme during the period 2000–2001 as complimentary copies.

Thanking you in anticipation,

### **Future Research Areas for Improving Livestock Production in Developing Countries Using Nuclear Technologies**

#### Introduction

The current programme strategy of the Joint FAO/IAEA Programme on Nuclear

Techniques in Food and Agriculture is to promote sustainable food security by assisting developing countries to apply nuclear technologies to intensify and diversify agricultural production systems and to improve food quality and safety, while ensuring efficient and environmentally sound management of natural resources and external outputs.

The mission of the Joint Programme is addressed through five discipline-oriented Sub-Programmes:

1. Animal production and health
2. Soil and water management and crop nutrition
3. Food and environment protection
4. Insect and pest control
5. Plant breeding

The mandate of the Animal Production and Health Sub-programme is to improve livestock production in developing countries through the support of problem-oriented research that identifies the constraints on production and develops cost-effective and sustainable solutions through the application of nuclear techniques. Information on past achievements and on-going research projects of the Sub-programme can be obtained from <http://www.iaea.org/programmes/nafa/d3/index.html>

## QUESTIONNAIRE

(Please keep in mind the mandate of the Animal Production and Health Sub-programme while filling in the questionnaire. The nuclear technique(s) should contribute significantly towards achieving the objectives of the identified research areas)

### **PART A**

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1. What are the gaps in scientific knowledge and the research priorities which need attention in order to increase livestock production in developing countries using **nuclear** technologies? Please give the three most important priorities in your view. Please outline a specific area of research (not a broad area such as genetic engineering, better management of feed resources, etc.)

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a) Research priority 1.

b) Reasons for choosing this area of research:

c) State nuclear component and its indispensable nature or comparative advantage:

d) What will be the benefits to farmers, and in how many years are they likely to reach them?

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a) Research priority 2.

b) Reasons for choosing this area of research:

c) State nuclear component and its indispensable nature or comparative advantage:

d) What will be the benefits to farmers, and in how many years are they likely to reach them?

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a) Research priority 3.

- b) Reasons for choosing this area of research:
- c) State nuclear component and its indispensable nature or comparative advantage:
- d) What will be the benefits to farmers, and in how many years are they likely to reach them?

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2. Is it possible to assign the above priorities according to:

a) Region (e.g. Africa, Asia, Latin America, Eastern Europe, etc.):

Priority	Yes	No	Regions	Reasons/Comments
1	<input type="checkbox"/>	<input type="checkbox"/>		
2	<input type="checkbox"/>	<input type="checkbox"/>		
3	<input type="checkbox"/>	<input type="checkbox"/>		

b) Locations (e.g. Hot humid, Semi-arid, Hilly, etc.)

Priority	Yes	No	Locations	Reasons/Comments
1	<input type="checkbox"/>	<input type="checkbox"/>		
2	<input type="checkbox"/>	<input type="checkbox"/>		
3	<input type="checkbox"/>	<input type="checkbox"/>		

c) Animal species (cattle, pigs, poultry, sheep, goats, fish, etc.)

Priority	Yes	No	Species	Reasons/Comments
1	<input type="checkbox"/>	<input type="checkbox"/>		
2	<input type="checkbox"/>	<input type="checkbox"/>		
3	<input type="checkbox"/>	<input type="checkbox"/>		

d) Themes (feeding strategies, use of new and lesser known feed resources, etc.)

Priority	Yes	No	Themes	Reasons/Comments
1	<input type="checkbox"/>	<input type="checkbox"/>		
2	<input type="checkbox"/>	<input type="checkbox"/>		
3	<input type="checkbox"/>	<input type="checkbox"/>		

e) Field (reproduction, genetics, nutrition, systems research, etc.):

Priority	Yes	No	Fields	Reasons/Comments
1	<input type="checkbox"/>	<input type="checkbox"/>		
2	<input type="checkbox"/>	<input type="checkbox"/>		
3	<input type="checkbox"/>	<input type="checkbox"/>		

---

3. Which of the above future research projects will be better served by co-ordinated research projects (6–10 research groups from different countries addressing a problem in a co-ordinated manner) over a 5 year period?

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4. With which of the research programmes that you have listed are you most familiar, and for which would you like to act as a resource person?

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5. In your priorities listed above, which other scientific disciplines should be involved?

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6. Would you like to see closer collaboration and interaction of the IAEA with the private sector, and what mechanism would you propose?

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7. Are there other international and/or bilateral programmes supporting projects related to those which you have identified, with which the IAEA could collaborate?

---

8. Additional information. Please feel free to share any other opinions which you think are relevant to this discussion:

**PART B — Information about the respondent**

Name:	
Address:	
Fax number:	
Telephone number:	
E-mail address:	
Field of specialisation:	

- |  | YES                      | NO                       |
|--|--------------------------|--------------------------|
| Do you wish to have feedback on the results of this exercise?                                  | <input type="checkbox"/> | <input type="checkbox"/> |
| Could we come back to you for further information if necessary?                                | <input type="checkbox"/> | <input type="checkbox"/> |
| Would you like to be placed on the mailing list for our Newsletter and technical publications? | <input type="checkbox"/> | <input type="checkbox"/> |

Thank you for taking the time to fill in this questionnaire.

p.s. If you need further information for completing this questionnaire please contact Ms. Rosario León de Müllner ([R.Leon-de-Muellner@iaea.org](mailto:R.Leon-de-Muellner@iaea.org))

## K. PUBLICATIONS

### Published:

1. Proceedings of the Final RCM of the Coordinated Research Project on “Development of Feed Supplementation Strategies for Improving the Productivity of Dairy Cattle on Smallholder Farms in Africa” held at the Agency’s Headquarters in Vienna, Austria, 7–11 September 1998 IAEA-TECDOC-1102, IAEA, Vienna (1999).
2. Proceedings of the Final RCM of the Coordinated Research Project on “Development, Standardization and Validation of Nuclear-based Technologies for Measuring Microbial Protein Supply in Ruminant Livestock for Improving Productivity” held at the Agency’s Headquarters in Vienna, Austria, 24–28 August 1998, IAEA-TECDOC-1093, IAEA, Vienna (1999).
3. Internal Quality Control (IQC) of Competitive Enzyme-linked Immunosorbent Assay (cElisa) for the Measurement of Antibodies against Rinderpest and Peste-des-Petitis Ruminants (PPR) Viruses Using Charting Methods.
4. Surveillance of Rinderpest in Africa — Reports 1998.

### In Press:

Proceedings of the Final RCM of the Coordinated Research Project on “Improved Diagnosis and Control of Foot-and-Mouth Disease in South East Asia Using ELISA-based Technologies” held in Phnom Penh, Cambodia, 22–26 February 1999.

These proceeding will be published as IAEA-TECDOCs.

### In Preparation:

1. Guidelines for the use of performance indicators.
2. Proceedings of the Final RCM of the Coordinated Research Project on “Use of RIA and Related Techniques to Identify Ways of Improving Artificial Insemination Programmes for Cattle Reared under Tropical and Sub-tropical Conditions”, held in Uppsala, Sweden, 10–14 May 1999.
3. Proceedings of the Second RCM of the Coordinated Research Project “The monitoring of contagious bovine pleuropneumonia in Africa using enzyme immunoassay” held in Lusaka, Zambia, 27 September – 1 October 1999.

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