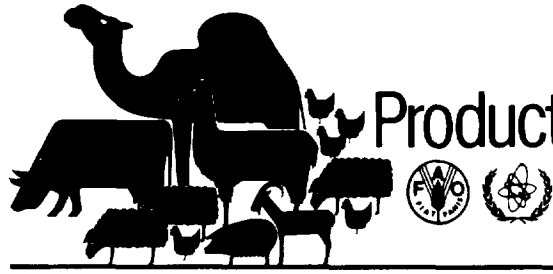

Animal Production and Health Newsletter

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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CONTENTS

Dear Colleague,

As we enter the second half of 1996 it is appropriate to look back briefly on what has been achieved this year but equally important to look forward to the programmes we are planning for the rest of this year and into 1997.

The first half of this year was dominated by the need to assist in the planning of the IAEA Technical Co-operation (TC) programme for the 1997/98 biennium. This has involved us in evaluating some 70 Technical Co-operation Project proposals from IAEA Member States. Whilst our job is primarily to conduct a technical evaluation of the feasibility and appropriateness of such proposals, we work closely with Area Officers in the Department of Technical Co-operation to assist them in preparing balanced national and regional programmes.

As expected, requests for support from Member States have continued to be in our main programme areas of animal reproduction/nutrition interactions and animal disease diagnosis but we have had several proposals dealing with veterinary drug residue analysis. Support in this area would be in keeping with the new thrust within the Joint FAO/IAEA Division on food quality and the establishment of the new FAO/IAEA Food Quality Laboratory within our Agriculture and Biotechnology Laboratory, Seibersdorf.

The final decision on which proposals can be supported will be made in the coming months, but the emphasis now being given by the Agency is towards a smaller TC Programme in terms of numbers of projects. However, since the resources to support this programme remain essentially the same, the programme will contain larger projects that have clearly defined objectives and projects whose effectiveness can be quantified in terms of social and economic impact at the national level. It is anticipated therefore that in the next biennium we will be supporting fewer TC projects within the Section, but the projects themselves will be distinctly problem-orientated (something I have stressed in the past two Newsletters) and will contain an active element of cost-benefit analysis and implementation scheduling through technical, time-bound workplans. I am convinced that the above approach will continue to provide you with the type of technical co-operation support you wish but make the most of the limited resources available. I would very much welcome any comments or suggestions you have regarding this approach.

Turning now to our FAO/IAEA Co-ordinated Research Programme (CRP), I draw your attention to the increasing part played by the use of standardised software for data collection and management. There is no doubt that this approach greatly enhances the effectiveness of individual Research Contracts and enables a much more comprehensive comparison to be made of results from country to country. For example, the software program AIDA (Artificial Insemination Data Acquisition) written by Mario Garcia, a staff member of the Section, has proved invaluable in the implementation of the CRP on artificial insemination. This concept towards standardisation of data collection and management within individual CRPs through the use of new purpose-built software is one we have used in the past within the CRPs dealing with rinderpest sero-surveillance, and we will undoubtedly extend this approach to all CRPs in the near future.

I would also like to draw your attention to the report on our External Quality Assurance Programme (EQAP) for the disease diagnosis programme. We have now completed the first round of testing for those laboratories using the FAO/IAEA rinderpest ELISA kit. A comprehensive report has been sent to all participating laboratories and this report clearly highlights the high standard of diagnosis and monitoring being achieved by participating countries. As this EQAP approach extends to other diseases and laboratories, I am convinced that we will develop a greater awareness of the major livestock disease problems affecting individual Member States, of the effectiveness of control and eradication programmes against such diseases, and through more transparency and confidence in results from individual countries, a significant improvement in international livestock trade practices.

Turning now to the future, I would like to mention the External Review of the Section and Laboratory activities that is due to take place in September. In keeping with an approach being undertaken in all activities of the Division, our programme of support to Member States in the next 7 - 10 years will be reviewed by an external consultants team of six scientists from 23 -27 September. Their task will not only be to evaluate what has been achieved, but to look at our future direction for the next decade and to indicate to us areas that should receive higher priority and indeed identify areas that we may have overlooked or neglected. Building on our own Medium Term Strategy plan I see this as a highly positive approach enabling us the opportunity to reallocate existing and seek fresh resources towards more long-term goals. We have deliberately selected a review team with little experience of our previous activities to provide us with a fresh look and the greatest opportunity of identifying newer areas for support. We would of course welcome any comments you may have and will provide you with a full account of the deliberations of this review team in the next Newsletter.

In April of next year, we will be hosting an international Symposium in Vienna entitled "Towards disease control in the 21st Century". Such symposia, organised by the Section, are held approximately every five years and we take such opportunities to direct our attention to issues we consider to be of international importance. I am sure you will agree that this applies to this meeting planned for next April!

Full details of the Symposium are contained in this Newsletter but I would ask you to urgently consider carefully whether you would like to attend. Resources are scarce for supporting this but we will do all we can to assist. It is vital that you let us know as soon as possible if you wish to attend and if you have need of support. Even if we are unable to assist you directly, we may be able to suggest other means but this requires time and April next year is not too far away!

Finally, once again there have been no major staff changes and our "team" remains intact. However, I am extremely pleased to be able to welcome Mark Robinson on board replacing Peter Wright as Head of the Animal Production Unit at our Seibersdorf laboratory. Mark joined us last year on sabbatical leave from the Agricultural Research Service of the US Government. He has an impressive pedigree in virology and the use of molecular technologies such as PCR and, as you can imagine, these skills will be immensely valuable to us in the coming few years. As Head of the Laboratory Unit he will be responsible for most aspects of ELISA and RIA kit development and dispatch, and the developmental research needed for our new PCR programme.

In closing, may I mention again that I would greatly welcome any comments or suggestions that you have on any aspect of our programme. For those of you fortunate enough to have E-mail I can be easily contacted at work on jeggo.ripo1.iaea.or.at.

With best wishes,

Martyn H. Jeggo
Head, Animal Production and
Health Programme

(A) STAFF

(1) IAEA Headquarters, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Vienna International Centre, Wagramerstrasse 5, P.O. Box 100, A-1400 Vienna, Austria

James D. Dargie, Director, Joint FAO/IAEA Division
Manase P. Salema, Deputy Director, Joint FAO/IAEA Division

Animal Production and Health Section

Martyn H. Jeggo, Head of Section
Mario Garcia, Technical Officer, Latin America
Roland Geiger, Regional Expert, Africa
Wicher Holland, Associate Professional Officer
Noble Jayasuriya, Regional Expert, Africa
Axel Colling, Associate Professional Officer
Singh Nanda, Technical Officer, Asia
John Crowther, Regional Expert for West Asia
Ron Dwinger, Technical Officer, Africa
Yeshay Folman, Sabbatical

Secretarial Staff:

Camilla Odinius
Rosario Leon de Müllner

(2) FAO/IAEA Agriculture and Biotechnology Laboratory, Animal Production Unit of the IAEA Seibersdorf Laboratory, A-2444 Seibersdorf, Austria

Wyn Richards, Head, Agriculture and Biotechnology Laboratory
Mark Robinson, Head of Unit
Dierk Rebeski, Technical Officer
Barbara van der Eerden, Associate Professional Officer

Technical Staff:

Mamadou Lelenta, Laboratory Technician
Eva-Maria Winger, Laboratory Technician
Herbert Haas, Laboratory Technician
Beata Rogovic, Laboratory Technician

(B) FORTHCOMING EVENTS

(1) New FAO/IAEA Coordinated Research Programme on "Application of Molecular Techniques in Animal Disease Diagnosis in Developing Countries"

Introduction

There has been rapid development in molecular techniques in the past 5 years. Such techniques have involved the use of radioisotopes and been pioneered at leading research Institutes. Some of the technologies, in particular, the use of Polymerase Chain Reaction (PCR) methodologies, can be identified as being extremely useful for unequivocal diagnosis of disease by the detection of molecular amounts of analyte indicating the presence of disease causing organisms. The PCR technique has become one of the most widely exploited methods of molecular biology since it is a relatively rapid means of producing microgram amounts of DNA from minute amounts of source material (in extreme cases a single organism or cell) and can be used on poorly stored samples which have deteriorated beyond levels suitable for analysis by other methods. The target material for PCR amplification can be native DNA, RNA, cloned DNA or PCR-derived products themselves. The system allows great flexibility in what amplification products can be generated and then analyzed.

The level to which such methodologies as PCR have now been developed should allow their introduction into developing country laboratories in order to answer questions hitherto not solvable by conventional serologically-based systems. However, although their application in developing countries has been attempted by a number of individuals for a variety of purposes, they have achieved inconsistent results. Despite this, specific applications of PCR and related molecular techniques can be identified in animal disease diagnosis to answer needs in developing countries. This may be most relevant to the future direction of 'tests' which are/may be recommended to establish the 'true' disease status of countries. Therefore, it is vitally important that such technologies are introduced as soon as possible. However, this process must be identifiable with the need for such tests to solve specific problems.

The application of molecular techniques in animal disease diagnosis in developing countries was the subject of a Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture Consultants meeting held in Vienna (20 - 23 November 1995). They concluded that the key to successful transfer of technology was the targeting of laboratories where there is best chance of success. They stated that this could be accomplished through extensive training of personnel, the supply of equipment, the standardization of methodologies and the identification of systems which have been developed to allow the most likely success in a short time frame. They maintained that the technology must also be sustained in developing countries through technical backstopping and expert visits cemented by frequent coordination meetings. They also considered that the establishment of an FAO/IAEA Coordinated Research Programme (CRP) would provide the ideal forum to meet these objectives. The consultants were able to identify three diseases, on the basis of current developments in developed countries and their current importance, which allowed best expression for the use of PCR in diagnosis. These were rinderpest, PPR and CBPP. The reason for these selections were that the diseases are important, are supported by extensive research in laboratories in the developed countries and that there is already identified molecular biological expertise in most of these laboratories, or a vital strategic need to have such technologies.

Objectives

(1) To develop standardized kits and protocols for the detection of rinderpest, PPR or CBPP using PCR technologies.

(2) To validate the kits in-country and disseminate expertise gained and reagents made to other laboratories in the region with similar interests.

(3) To undertake studies using PCR and related technologies to better understand the prevalence of rinderpest, PPR and CBPP in participating countries.

Programme Implementation

Research Contracts

On the basis of technically sound proposals from institutions, Research Contracts will be awarded for an initial period of 1 year. Contracts would be renewable every year up to 5 years subject to the satisfactory progress of each yearly Contract. Research Contracts provide modest financial support (around US$ 2-12,000 per year with an initial higher input in the first year to provide equipment). The Contracts would follow an agreed workplan and are awarded on a cost-sharing basis, i.e. institutes concerned would be expected to provide support to achieve the project's objectives. It is anticipated that 8 Research Contracts will be awarded under the proposed scheme. It is envisaged that countries could also integrate their requirement for equipment through application to relevant Regional projects. In each case, the work proposed should follow a logical sequence, e.g. for the first year's work

- establishment of equipment
- establish training abroad and through training course
- development of systems during training abroad
- setting up parallel systems at home laboratory with reagents developed.
- preparation of presentation of results for first Research Coordination Meeting

Subsequent workplans will be based on results and conclusions of first year's work.

Research Coordination Meetings

Research Coordination Meeting will be held as soon as practicable after setting up the CRP. It is anticipated that this will be in April 1997 in Vienna. Thereafter, the meetings will be held every 12 -18 months. During these meetings detailed workplans of the coming year will be prepared taking into account both national and regional priorities. Training will also be provided in PCR. The previous year's results will also be presented by each Research Contract holder followed by the preparation of workplans for the coming period.

Coordination of Technical Input

This will be achieved mainly through the processes of defining workplans and provision of defined reagents and protocols. Training will also be monitored by rapid

feedback of problems arising in the Research Contract holders' laboratories following the period of intensive training.

Complimentary FAO/IAEA Support

IAEA has a programme of support through national IAEA Technical Cooperation Projects (TCP). These are concerned with aspects of disease control including 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 backstopping through visits by IAEA experts for periods of up to 1 month. Such support would be available to IAEA Member States. An inter-regional training course on PCR will take place at the FAO/IAEA Agriculture and Biotechnology Laboratory, Austria, in November 1996. It is anticipated that a number of the Research Contract holders will attend the course to receive basic theoretical and practical training.

Submission of Proposals

Applications are now being invited for inclusion in the programme. Research Contract Proposal forms can be obtained from IAEA, and national Atomic Energy Commissions and UNDP offices. Such proposals will 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. The deadline for receipt of such proposals is August 1996. Following evaluation of the proposals they will be submitted for approval in October 1996.

(2) **First FAO/IAEA Research Coordination Meeting on "Development, Standardization and Validation of Nuclear-based Technologies for Measuring Microbial Protein Supply in Ruminant Livestock for Improving Productivity", Gadjah Mada University, Jogyakarta, Indonesia, 5 - 9 August 1996**

(3) **FAO/IAEA Interregional Training Course on "Use of Molecular Techniques (PCR, DNA probes) for the Diagnosis and Monitoring of the Major Livestock Diseases", IAEA Laboratory, Seibersdorf, 21 October - 15 November 1996**

Participation: The training course is open to 16 participants from developing Member States of FAO and IAEA.

Background of the course: In developing countries diseases still sharply reduce livestock production. In the past 9 years, the main activity of the Animal Production and Health Section of the Joint FAO/IAEA Division has been the development and transfer to developing countries of internationally accepted, validated and standardised enzyme-linked immunosorbent assay (ELISA) kits for diagnosing diseases, the monitoring of disease control programmes and for studying the epidemiology of diseases. New techniques like the polymerase chain reaction (PCR) and DNA probes are now being developed and introduced to complement the established diagnostic techniques for

infectious diseases. The Animal Production and Health programme will increasingly support such molecular-based technologies.

Purpose of the course:

To introduce the concepts of PCR and DNA probes in animal disease diagnosis. To provide practical training in these techniques. To provide training in setting up a diagnostic PCR laboratory.

Participants' qualifications:

Applicants should be veterinarians or senior technicians and intimately involved in diagnostic work at the bench level.

Nature of the course:

The course will be of a practical nature supplemented with theoretical lectures. The lectures will deal with the basics of molecular techniques, and on the routine use of diagnostic PCR and DNA probes in animal disease diagnosis. Information will be provided on how to set up a diagnostic PCR laboratory. Epidemiological lectures will concentrate on the use of these techniques in the monitoring of disease control programmes, their diagnostic performance and their limitations. The lectures will be followed by practical exercises on these molecular techniques.

Application procedure:

Nominations should be submitted in duplicate on the standard application forms for training courses. Completed forms should be endorsed by and returned through the official, established channels (e.g. the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received **by 19 August 1996**. Nominations received after this date or applications sent directly by individuals or private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations is submitted by telex/fax with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers), to enable the IAEA to make a preliminary evaluation of candidates.

Language certificate:

The Course will be held in English. In the case of countries in which English is not an official or working language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which English is spoken.

Administrative and financial arrangements:

Nominating governments will be informed in due course of the names of selected candidates and at that time, full details will be given of procedures to be followed with regard to administrative and financial arrangements. The IAEA will pay the full cost of the participants' air travel from their home countries to Vienna and return. During their attendance at the course, participants will receive from the IAEA a stipend sufficient to cover the cost of their accommodation, food and incidental expenses. The organisers of the course do not accept liability for the payment of any costs 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 attending the course, and it is clearly understood that each government, in nominating candidates, undertakes responsibility for such coverage. Governments would be well advised to take out insurance against these risks.

(4) **FAO/IAEA/ILRI Workshop on the "Epidemiology and Monitoring of Tick-borne Diseases Using Enzyme Immunoassays", Veterinary Research Laboratory, Harare, Zimbabwe, 25 November to 6 December 1996**

Participation:

The workshop is open to 8 participants from developing Member States of FAO and IAEA in Africa.

Background to the workshop:

Tick-borne diseases (TBD) are still a major constraint to livestock production in developing countries. The Animal Production and Health Section of the Joint FAO/IAEA Division has developed and transfered enzyme-linked immunosorbent assay (ELISA) kits for diagnosing the major diseases affecting livestock and in the monitoring of national and regional control programmes against such diseases. The use of ELISAs in the diagnosis of TBD has been impeded through the low specificity of the ELISA but the development of recombinant antigens, sensitivity and specificity of the ELISA has considerably increased. This technique now offers many advantages over conventional diagnostic techniques in the monitoring of TBD control programmes.

Purpose of the workshop:

The workshop will provide training in the epidemiology and diagnosis of TBD and in the monitoring of TBD control programmes using immunoassay methods. The participants will be assisted in the evaluation of the data from their national TBD control programmes.

Participants' qualifications:

Participants should be veterinarians or laboratory technicians who are involved in the diagnosis and control of tick-borne diseases and who have a basic working knowledge of enzyme immunoassays in the

diagnosis of TBD. It is expected that the participants will have already some basic data available on their national TBD control programmes.

Nature of the workshop:

The workshop will be a combination of lectures and practicals but primarily of a practical nature focusing on the evaluation of the monitoring data from the national TBD control programmes.

Application procedure:

Nominations should be submitted in duplicate on the standard application forms for training courses. Completed forms shoud be endorsed by and returned through the official, established channels (e.g. 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, Wagramerstrasse 5, 1400 Vienna, **by 30 August 1996**. Nominations received after this date or applications sent directly by individuals or private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations be submitted by telex/facsimile with the following information: name, age, academic background, present position and full working address (incl. telex, telephone and facsimile numbers).

Language certificate:

The Course will be held in English. In the case of countries in which English is not an official or working language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school cultural institution or an embassy of a country in which English is spoken.

Administrative and financial arrangements:

Nominating governments will be informed in due course of the names of selected candidates and at that time, full details will be given of procedures to be followed with regard to adminstrative and financial arrangements. The IAEA will pay the full cost of the participants' air travel from their home countries to Harare and return. During their attendance at the course, participants will receive from the IAEA a stipend sufficient to cover the cost of their accommodation, food and incidental expenses.

The organizers of the course do not accept liability for the payment of any costs 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 candidates, undertakes responsibility for such coverage.

Governments would be well advised to take out insurance against these risks.

(5) **FAO/IAEA Regional Training Course on "The Use of Enzyme Immunoassays in the Diagnosis and Monitoring of Contagious Bovine Pleuropneumonia", ARC, Onderstepoort Veterinary Institute, Onderstepoort, South Africa, 5 - 31 May 1997**

Deadline for Nominations: 1 February 1997

Participation: The training course is open to 18 participants from developing Member States of FAO and IAEA

Background of the course:

In the past 9 years, the main activity of the Animal Production and Health Section of the Joint FAO/IAEA Division has been the development and transfer to developing countries of internationally accepted, validated and standardised enzyme-linked immunosorbent assay (ELISA) kits for diagnosing diseases, the monitoring of disease control programmes and for studying the epidemiology of diseases.

In developing countries diseases still sharply reduce livestock production and in particular contagious bovine pleuropneumonia (CBPP) is an emerging disease in Eastern and Southern Africa. The disease is spreading to countries where it has been previously controlled and even eradicated.

Laboratory diagnosis of CBPP is difficult and the commonly used diagnostic tests such as the Complement Fixation Test (CFT) have a number of limitations. In chronic cases the sensitivity is very low and used as a screening test it shows a low specificity. However, a monoclonal antibody based test competitive ELISA, which is currently being being validated in several African and European laboratories, has many advantages compared to the CFT in particular with regard to specificity.

New techniques like the polymerase chain reaction (PCR) and DNA probes are now also increasingly used to complement the established diagnostic techniques. In the diagnosis of CBPP, PCR can be used to confirm the initial results of the CFT and the ELISA.

Purpose of the course:

To train scientists of African countries involved in animal disease diagnosis in ELISA technology and in the diagnostic principles in the control of CBPP with special emphasis on the use of the FAO/IAEA CBPP ELISA kits.

To introduce aspects on the quality control and trouble shooting of ELISAs.

To provide training in data management in animal disease diagnosis using the ELISA and in the principles of seroepidemiology in disease control programmes and in the monitoring of such programmes.

To introduce the concepts of the use of PCR and DNA probes in animal disease diagnosis and in the monitoring of disease eradication programmes.

To provide practical training in these techniques.

Participants' qualifications:

Applicants should be veterinarians or senior technicians and intimately involved in the diagnostic work on CBPP at the bench level. They should be experienced in laboratory techniques with a strong working knowledge in serology.

Nature of the course:

The course will be of a practical nature supplemented through lectures.

The lectures will deal with immunology with particular reference to immunoassays (indirect, competitive and antigen capture ELISA) and their troubleshooting and quality control. Practical exercises on these techniques will be given. Lectures will also be given on PCR and DNA probes in animal disease diagnosis and their use will be demonstrated.

The epidemiological lectures will concentrate on the use of these techniques in the monitoring of disease control programmes, their diagnostic performance and their limitations. A strong emphasis will be given on the application of testing strategies (serial, parallel) in CBPP control programmes.

Application procedure:

Nominations should be submitted in duplicate on the standard application forms for training courses. Completed forms should be endorsed by and returned through the official, established channels (e.g. the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received **by 1 February 1997**. Nominations received after this date or applications sent directly by individuals or private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

It is suggested that advance information of the nominations is submitted by telex/fax with the following information: name, age,

academic background, present position and full working address (incl. telex, telephone and facsimile numbers) to enable the IAEA to make a preliminary evaluation of candidates.

Language certificate:

The course will be held in English and in the case of countries in which English is not an official or working language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which English is spoken.

Administrative and financial arrangements:

Nominating governments will be informed in due course of the names of selected candidates and at that time, full details will be given of procedures to be followed with regard to administrative and financial arrangements. The IAEA will pay the full cost of the participants' air travel from their home countries to Johannesburg and return. During their attendance at the course, participants will receive from the IAEA a stipend sufficient to cover the cost of their accommodation, food and incidental expenses.

The organisers of the course do not accept liability for the payment of any costs 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 attending the course, and it is clearly understood that each government, in nominating candidates, undertakes responsibility for such coverage. Governments would be well advised to take out insurance against these risks.

(6) FAO/IAEA Symposium on "Diagnosis and Control of Livestock Diseases using Nuclear and Related Techniques", "TOWARDS DISEASE CONTROL IN THE 21ST CENTURY", VIC, Vienna, Austria, 7-11 April 1997

The Symposium will be organised by the Animal Production and Health Section of the Joint FAO/IAEA Division. Spread over 5 days, it will cover the areas of serology, molecular biology, epidemiology and socio/economics, and their current and future role in the diagnosis, control and eradication of the major diseases affecting livestock. The majority of presentations will be given by invited speakers with an international reputation in their subject area. Poster presentations are invited by those wishing to attend.

Those wishing to attend should contact the Section as soon as possible. Please quote the code D3-SM-348 in any correspondence. Telephone: (+43-1) 2060 Extension 26054; Fax +43-1 20607; Telex: 1-12645; Cable: INATOM VIENNA; and E-mail address: crowther@ripo1.iaea.or.at

PROVISIONAL PROGRAMME FOR THE SYMPOSIUM

DAY ONE

INTRODUCTION - Areas of technology and its transfer; epidemiology and socio/economic factors.
TECHNOLOGY INTRODUCTION - *To cover all technologies applicable to disease diagnosis pure and* applied research. Feasible vs unfeasible technologies.
ELISA-OVERVIEW- Summary of achievements of ELISA. Historical context of FAO/IAEA Division approaches.
ELISA-RINDERPEST.
ELISA-BRUCELLOSIS
ELISA-TRYPANOSOMOSIS
ELISA-FOOT-AND-MOUTH DISEASE
OTHER FORMS OF ASSAYS - Other appropriate assays, e.g. latex particle, dyes, homogeneous ELISA.
BIOSENSORS - Developments in transduction techniques for rapid measurement of antigen/antibody.
PEN SIDE TESTS - Application to "in the field" testing.

DAY TWO
MONOCLONAL ANTIBODIES - Uses, advantages and disadvantages of MAb revolution.
MOLECULAR BIOLOGICAL TECHNIQUES-OVERVIEW- Summary of research approaches leading to rapid advance techniques.
PCR OVERVIEW-Types and scope PCR in diagnosis.
DIAGNOSTIC APPLICATIONS OF PCR
MOLECULAR BIOLOGICAL TECHNIQUES PAPER-FMDV Molecular epidemiology, direct RNA sequencing, PCR gene amplification-uses in preparing reagents.
MOLECULAR BIOLOGICAL TECHNIQUES PAPER - RP - Diagnosis, differential diagnosis, molecular epidemiology, tech transfer?
MOLECULAR BIOLOGICAL TECHNIQUES PAPER-OTHERS - CBPP
KITS, PROBLEMS AND SOLUTIONS - *Sustainability of kits. Commercialization. Regionalization.*

DAY THREE
VACCINES - Basic principles. New approaches. State of play. Future horizons.
EPIDEMIOLOGICAL ASPECTS - Overview on what we mean by epidemiology.
SAMPLING STRATEGIES - Why sample, how to sample.
APPROACHES TO MONITORING CONTROL PROGRAMMES - Integrated approaches used by FAO/IAEA Division.
QA/EQA/QC ETC. WHERE ARE WE NOW? - Standardization/control of tests in laboratories.
EXAMPLE OF QA MONITORING - Rinderpest ELISA. Importance to international recognition.
TRAINING/TECH TRANSFER -Types of successful training, how is success measured, experiences.

DAY FOUR
INFORMATION NETWORKS - What is being done now? Future plans?
INFORMATION TECHNOLOGIES (TELOS) - Gathering information in the field, transmission of data to central sources, teaching aids, data bases, intelligent data bases, satellite interfacing (disease reporting), data exchange, reference materials, diagnostic aids, updating.
GIS - Where are we now? Complications of hardware and software. Availability of maps.
MATHEMATICAL MODELLING - Uses and abuses of modelling, what can be done, what has been done?
CLIMATIC CHANGE - Are there short term measurable effects causing differences in the distribution of vectors of animal diseases?
SATELLITES ETC - Is this high tech approach of any use at all?
ECONOMIC/SOCIAL FACTORS-OVERVIEW - *Link between demography, social aspects.*

DAY FIVE
SUSTAINABILITY - Overview.
COST/BENEFIT APPROACHES - Methods explained which quantify problems and hope to lead to best solutions
FUTURE OF LIVESTOCK TRADE - Overview factors affecting livestock industry on world scale.

(7) Outside Related Meetings

7.1 The International Training Centre (PHLO) of the Wageningen Agricultural University, Netherlands, will host an International Postgraduate Training Course "Animal Health Economics - Principles and Applications", Mendenhall, Pensylvania, USA, 14-19 October 1996. For further details and application forms, please contact Mr. M.I. Visser-Reyneveld, PHLO, Wageningen Agricultural University, P.O. Box 8130, 6700 EW Wageningen, The Netherlands, Telex: 31 317 426 547.

7.2. XV International Symposium of World Association of Veterinary Microbiologists, Immunologists and Specialists in Infectious Diseases (W.A.V.M.I.). Subjects: "SALMONELLOSIS-BRUCELLOSIS As World Health Problems in Humans and Animals", 17 - 21 February 1997, Limassol, Cyprus. Inquiries: Dr. K. Polydorou, Chairman of the XV Symposium, Veterinary Public Health Institute, P.O. Box 284, 2150 Nicosia, Cyprus.

(C) PAST EVENTS

(1) FAO/IAEA Training Course on "The Use of Immunoassay Technologies for Studies on the Diagnosis and Control of Foot-and-Mouth Disease in South Asia", Ho Chi Minh City, Vietnam, 4 - 23 March 1996

Twenty-two participants from 17 countries were selected although only 17 attended for the full three weeks of the course.

Linked with support being provided through an FAO/IAEA Co-ordinated Research Programme established in 1994 and entitled "Improved diagnosis and control of foot-and-mouth disease in South East Asia using ELISA-based technologies", this course aimed to increase the diagnostic capability of national veterinary laboratories in the region to meet the needs of the OIE-initiated regional FMD control and eradication programme.

To ensure full co-ordination with the OIE programme and to provide focus on epidemiological training, the first week was conducted as an epidemiological workshop with OIE, attended not only by course participants but also by the chief veterinary officers from 9 countries in the region. The second week provided intensive laboratory training in the use of the FAO/IAEA FMD ELISA kits for the detection of the FMD virus and the immune response of animals to FMD infection, with the last week of the course focusing on molecular technologies currently being used to assist the diagnosis and study of FMD virus.

A representative from each participating country (Vietnam, China, Laos, Thailand, Bangladesh, Korea, Myanmar, Mongolia, Pakistan, Sri Lanka, The Philippines, Malaysia,

Singapore, Hong Kong and Cambodia) gave a presentation detailing the current FMD situation in their country and the range of diagnostic tests available. This provided a starting point for a series of lectures and discussions covering the current FMD situation in the region and future strategies for diagnosis and control. These culminated in a series of conclusions and recommendations.

The conclusions and recommendations made during the workshop have varying implications for national authorities in the region, OIE, FAO and IAEA. For completeness, the full list is detailed below.

1. Uncontrolled animal movement is a major factor in the spread of foot-and-mouth disease (FMD). Currently, effective control of movement is not possible for most countries in S-E Asia. A regional policy for FMD control is essential. Considering that the subject has been dealt with by the OIE Sub-commission for SEAFMD.

It was recommended that:

- additional information is obtained about cross-border movement of animals from India and China to neighbouring countries and vice-versa;

- data on the price of livestock in countries and in the regions within countries is monitored to provide an indicator of probable animal trade movements and likely changes in movement.

2. Legislation for the notification of FMD exists in all countries in S-E Asia. But enforcement of reporting is frequently a problem.

It was recommended that:

- national specialists in communication are recruited to inform farmers within their territory of the benefits of controlling FMD so they will co-operate by reporting disease.

3. The OIE categories "FMD-free country or zone with vaccination" are difficult to verify.

It was recommended that:

- OIE consider redefining these categories as "PROVISIONALLY FMD free countries or zones with vaccination".

4. There is great variation in the diagnostic capabilities of national veterinary laboratories in S-E Asia. These laboratories have a critical role to play in the regional control and eradication of FMD.

It was recommended that:

- the capabilities of national FMD diagnostic laboratories be strengthened where appropriate.

5. There is an urgent need to establish a regional reference laboratory for FMD in S-E Asia to support national diagnostic laboratories.

It was recommended that:

- the appropriate bodies take action necessary to designate and implement a functional regional reference laboratory for the region.

6. There is an extreme shortage of FMD vaccine in S-E Asia.

It was recommended that:

- all aspects of this problem are urgently addressed by national and international bodies concerned.

7. There is a requirement for veterinary authorities in the region to have access to an independent authority which can provide advice and assurance about the quality of FMD vaccines.

It was recommended that:

- an international working group is established to formulate proposals to resolve the issue of vaccine quality assurance and control for the region.

8. The monthly FMD reporting system will be an essential device for communication of disease information throughout the region. In most countries veterinary services require strengthening to improve reporting of FMD.

It was recommended that:

- the veterinary authorities of the countries in the region ensure that the reporting system is implemented and the required data reliably and promptly submitted to the OIE Regional Office and the OIE Central Bureau in Paris in the case of an emergency.

- as part of strengthening of veterinary services a communications specialist should be employed whose highest priority should include developing methods to convince livestock owners of the advantages of reporting FMD.

9. The water buffalo is of great importance within the livestock population of S-E Asia but there is limited published data about FMD in that species, in particular their susceptibility to infection, role of transmission and maintenance of infection, carrier state and response to FMD vaccination.

It was recommended that:

- further research is carried out on these aspects.

- a questionnaire is circulated throughout the veterinary services in the region to collect data for analysis and discussion at the next meeting of the OIE FMD Sub-commission (in The Philippines in 1997).

10. Strategies for vaccination are likely to differ between countries in the region.

It was recommended that:

- the advice of experts is sought to formulate vaccination programmes for the different countries.

11. Several countries of the region have the technical capability to apply the liquid-phase blocking ELISA to assess the vaccination coverage within their territory and to monitor the response of animals to vaccine.

It was recommended that:

- the necessary measures are taken to promote and extend these activities in the region.

12. There exists published work showing that FMD vaccines can be applied simultaneously with other vaccines, e.g. HS without reducing the efficacy of response, and considerable advantage could be gained using a combined HS/FMD vaccine.

It was recommended that:

- further investigations are conducted to confirm these findings under a wider range of conditions.

13. Ensuring and sustaining the control and eradication programme for FMD will require the support of the farming communities, national administrators and international donor Agencies.

It was recommended that:

- countries should carry out cost-benefit analysis for controlling/eradicating FMD at the national and local level. This should be done in consultation with experts to ensure that such studies provide a realistic indication of cost and benefit.

14. There is a need for more precise information about the pattern and nature of outbreaks of FMD within villages and intensive livestock production systems throughout the region.

It was recommended that:

- well-structured observational studies be carried out on village outbreaks and intensive production systems to provide descriptive epidemiology of the patterns of the disease over time. These studies should collect information on the costs of the disease for use in cost/benefit analyses.

15. There is a need within the region for an improved understanding of epidemiological methods, data handling and descriptive statistics relevant to the region and individual countries.

It was recommended that:

- at the national level "core" people be identified, that they be provided with adequate training and that support be provided at the national level to fully utilise this resource.

16. Approaches to evaluating and solving the FMD problem are being developed by OIE and incorporated into relevant OIE codes.

It was recommended that:

- all specialist involved in work to establish or obtain international recognition of countries or zones FMD-free should be fully familiar with the relevant provisions within the OIE International Animal Health Code.

17. The countries of S-E Asia are preparing 1997 budgets for strengthening their veterinary services in support of the SEAFMD campaign.

It was recommended that:

- budgetary needs for strengthening veterinary diagnostic laboratories be determined and conveyed to the national authorities concerned.

(2) Second Coordination Meeting of Project Coordinators of AFRA Project VIII - "Radioisotopes in Animal Reproduction and Nutrition", Accra, Ghana, 11-15 March 1996

The above meeting was hosted by the Ghana Atomic Energy Commission. It was attended by the project coordinators of AFRA Project VIII entitled "Radioisotopes in animal reproduction and nutrition", from Algeria, Cameroon, Egypt, Ethiopia, Ghana, Kenya, Libya, Madagascar, Morocco, Nigeria, Sudan, Tunisia, Zaire and Zambia. The meeting reviewed project activities and achievements and identified regional needs and priorities for the design and formulation of a five-year follow-on programme in ruminant livestock production in Africa.

Through discussion and debate, the meeting identified two development objectives for the future, namely, (a) the development and field evaluation of feed supplementation packages for improving milk and meat production, using locally-available feed resources; and (b) achieving self-sufficiency in RIA kit production in the region through the use of bulk

reagents. For each of these objectives, the meeting designed a five-year work programme identifying activities, output success criteria and requirements.

The meeting concluded that significant progress has been made since the previous project meeting held in Addis Ababa, Ethiopia in 1994. The meeting unanimously recommended that in view of the excellent progress and regional importance of the project, the Agency secure funds for an extension of the project for a further five years. Details of the inputs required were included in the full report of the meeting.

(3) First Meeting of the Working Group on "The Use of the FAO/IAEA RIA Kit for Progesterone Determination in Milk", Lima, Peru, 25-29 March 1996

The meeting was held at the Universidad Agraria La Molina, Lima, Peru, as part of the Regional IAEA TC Project RLA/5/028 under the ARCAL Programme (Arreglos Regionales Cooperativos para la Promoción de la Ciencia y la Tecnología Nuclear en América Latina). The meeting was attended by 15 scientists representing 12 countries from the region, 1 expert from outside the region and 4 locals as observers plus the FAO/IAEA technical officer. The purpose of the meeting was to acquaint participants with the use of the new FAO/IAEA 'Self-coating' progesterone radioimmunoassay (RIA) kit, to compile the results achieved during the five-year period of the ARCAL programme and to discuss potential future activities with the FAO/IAEA on livestock research and development in Latin America. We would like to thank Dr. Carlos Gómez and his collaborators Dr. H. Cárdenas, Dr. A. Cordero and Ms. T. Alvarado for the excellent organization and valuable assistance.

All participants agreed that the FAO/IAEA Self-coating Progesterone RIA kit allows them to be more self-reliant in the performance of progesterone assays. Nevertheless, two major constraints are affecting the quality of the assay, (a) the evaporation of the tracer's solvent and/or the leakage of the fluid from the vial due to improper cap sealing from the manufacturer; and (b) the loss of antibody binding activity within 4-6 months after reconstitution.

Most of ARCAL countries have benefitted from the programme and the established RIA laboratories are currently active. There has been an impressive number (> 1,000) of technical publications as reported by 14 of the surveyed laboratories. One of the biggest assets of the programme is the improvement of technical knowledge in livestock production acquired not only by project staff but also through the level of education to university students and livestock professionals over the years.

The conclusions and recommendations of the meeting were as follows:

(a) Further training through expert missions and workshops on the use of the FAO/IAEA 'self-coating' progesterone RIA kit will be necessary. Procurement of labelled progesterone should be done locally if possible. Lyophilized antibody should be supplied in smaller volumes.

(b) The ARCAL III Programme has substantially contributed to the improvement of scientific knowledge on livestock reproduction, nutrition and management in Latin America; has provided invaluable equipment and research facilities to a large number of universities and research centres; has improved the academic level of thousands of livestock professionals; has had an important impact on livestock productivity; and

finally, it has enriched the welfare of thousands of farmers and facilitated more and better animal products for human consumption.

(c) The IAEA should facilitate a transition period in which project counterparts can organize themselves and be allowed to introduce the highly sustainable new FAO/IAEA 'self-coating' progesterone RIA kit. Support for a Regional IAEA TC Project entitled "Research and Commercial Applications of Immunoassay Techniques in Animal Production" was considered to be the best option.

(4) Second FAO/IAEA Research Coordination Meeting of FAO/IAEA Coordinated Research Programme on "Development of Feed Supplementation Strategies for Improving the Productivity of Dairy Cattle in Smallholder Farms in Africa", Rabat, Morocco, 1-5 April 1996

This meeting was held at the Institut Agronomique et Vétérinaire Hassan II, Rabat, Morocco, and was attended by 13 Research Contract holders, 5 Research Agreement holders, one Consultant and numerous staff of the Departments of Animal Physiology and Animal Nutrition of the Institute. The CRP is aimed at obtaining baseline information and monitoring possible effects of various feed supplementation strategies developed using locally available feed resources, on production and reproductive efficiency in smallholder dairy cattle in Africa. The main purpose of this meeting was to discuss results obtained to-date and prepare workplans for the next phase.

The meeting was opened by Dr. Guessous Fouad, the Vice Director of the Institut Agronomique at Veterinaire Hassan II. The first two days were dedicated to oral presentations on survey data aimed at identifying major nutritional and management constraints to improving productivity under smallholder farming conditions in each project site. One afternoon was spent on a field trip to visit three smallholder farmers in order to get first-hand information on dairy cattle production systems in Morocco. One further day was dedicated to practical work on data storage using the data base files provided by the Joint Division and data analysis using the computer statistical package SYSTAT. This was conducted by the consultant, and his assistant who attended the meeting as an observer.

After discussion, and in consultation with the Research Agreement holders and the Consultant, each Research Contract holder drafted a workplan for the second phase of the project. A brief outline of this work programme was presented by each Research Contract holder for general discussion on the last day of the meeting before finalizing the Conclusions and Recommendations. The Chief Scientific Investigators agreed to send detailed workplans to the Agreement holders, with a copy to the Joint Division, before the end of June 1996, for further comments. The final meeting of the programme will take place during the second half of 1998, probably in Kenya.

Local arrangements including meeting facilities were excellent and we would like thank the host institute and Dr. Abdelhai Guerouali and his colleagues for their support and assistance in making this meeting a success.

The main conclusions and recommendations were as follows:

Phase I

1. All participants have taken care to follow the protocol established for Phase 1 during the first RCM held in Morogoro, Tanzania. The existing dairy cattle production systems have been well described and documented. Farms or herds included in the study conform to systems of production that are typical of the region. All participants have been able to collect information on live weight change, body condition score, milk yield, reproductive parameters, faecal egg counts, chemical composition of feeds and the amounts of feed offered (wherever possible). The numbers of animals included in the observations were adequate or were close to the target of 80-100 in all projects.

2. All participants have attempted to enter data using the database files provided by the Agency but with varying levels of success.

3. Data collected require analysis to determine the baseline information. Not all participants presented adequate summary statistics. In some cases, data measured at intervals over a time sequence contain varying number of animals at each time point. Such repeated measurements have been sorted using a single independent variable without reference to possible confounding variables (e.g. calendar month vs month of lactation).

4. Individual projects have progressed at different rates and therefore have different Phase I end dates. However, such studies should be brought to an end as soon as possible and Phase II studies started. Overlap between the two phases is possible since continuing Phase I studies involved cows in mid and late lactation whereas cows to be recruited for Phase II would be dry and in late gestation.

Phase II

1. Objectives of Phase II studies should be clearly established from Phase I results.

2. The aim of Phase II studies will be to determine the effects of interventions on the established systems. Contemporary control animals are essential although it is unlikely that it will be possible to have control and treatment animals on the same farm.

3. The major form of intervention will be related to diet. Any supplement should be appropriate for the region and both choice and level of supplementation should be biologically and economically realistic.

4. Data collected during Phase II should be relevant to monitoring responses to the intervention. Thus, observations that proved to be of secondary importance during Phase I should not be continued in Phase II (e.g. faecal egg counts). It is also important to ensure that physical measurements are initiated in late pregnancy/dry period and not at calving, as this would allow potential influences on lactation/reproduction to be identified.

5. Data collected during Phase II should be entered directly into the statistical package SYSTAT, a copy of which has already been distributed to participants.

6. Every effort should be made to ensure the continuing cooperation of the farmers. Inducements could include the provision of advice and services, feedback on the progress of the project, veterinary care, etc.

7. In view of the uniqueness of the data that has been collected so far, on production and reproductive parameters of dairy cattle under existing smallholder farming systems in the African region, each Contract holder should prepare a paper using results from Phase 1 for publication as an IAEA TECDOC.

(5) Second Research Coordination Meeting of the IAEA Model Regional Technical Cooperation Project RAW/5/004 "Support for Rinderpest Surveillance in West Asia", Beirut, Lebanon, 9 - 12 April 1996

This meeting comes one year and four months after the start of this regional project dealing with the surveillance of rinderpest in West Asia and the clearly stated objectives for year 2 still have seven months to be achieved. One major task in year 2 was to seek the participation of countries which did not attend in year one. This was successful with Lebanon, Syria, Turkey, Iran, Jordan, Yemen, Saudi Arabia, United Arab Emirates (UAE), Uzbekistan and Kazakhstan attending the meeting. Unfortunately, the Iraq participants had visa problems and could not finally attend the meeting, and this was highly regretted.

A key area of the meeting was the presentation of country reports. In an attempt to increase the value of such reports, a guide was sent out to all countries before the meeting which improved the presentations and allowed a better exchange of data. Another key area, which is perhaps less quantifiable, was the role of the meeting in furthering understanding and confidence between countries of the region. A further task was to identify problems concerning equipment and equipment needs of participating countries.

Presentations by IAEA experts were given on statistical considerations in sampling populations (Dr. Allen) and on an in depth analysis of disease agents in sheep in Syria (Dr. Gruner). The meeting also considered the problems of immunity/vaccination in calves and of peste-des-petits ruminants (PPR) in West Asian countries. The rinderpest External Quality Assurance Programme instigated in PARC participating laboratories was described. The countries supported under this project (RAW/5/004) will participate in a similar exercise this year. Strategies to help laboratories use Internal Quality Control for day-to-day monitoring of tests through the use of control charts were discussed and examples of such charts were provided to participants.

Several participants expressed concern over the continuing quality of the ELISA kit now that a commercial concern was involved. The Regional Coordinator pointed out there should be no difference in the reagents and quality of the kits since the Pirbright Laboratory, UK, will still produce and send out the reagents.

The development of a dip stick technology to confirm the diagnosis of rinderpest for potential use at the pen side was described. Participants welcomed such a tool and saw great benefits when it becomes routinely available. A similar PPR specific dip-stick is also being developed.

The meeting reached the following set of CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. The meeting reviewed progress and identified problems associated with the implementation of the project at the country level. Generally where the infrastructure is being maintained, the supplied equipment and expertise is having a significantly positive effect on rinderpest control and eradication.

2. The meeting was useful in stressing the importance of a regional approach to rinderpest. It highlighted the problem areas of rinderpest in the region (including the complicating factors of PPR). The meeting called for greater cooperation in the region in periods between the coordination/workshops organized under the project (RAW/5/004).

3. The meeting highlighted the role played by certain countries in combating rinderpest. Of particular mention was Iran which holds a tremendously important strategic position and it was refreshing to note that Iran cooperates freely with other countries and offers training and expertise. Turkey specifically commended this Iranian role.

4. The introduction of further countries into the programme, e.g. Uzbekistan, Kazakhstan, Saudi Arabia (as well as Iraq) was thought vital to the regional basis of the project. The meeting welcomed their participation and the increased possibilities for further information exchange.

5. The meeting thought it vital that a Regional Coordinator was maintained in Vienna and could not envisage such a Regional officer being sited within any one country of the region. The meeting endorsed the technical approach of the Joint Division and stressed the great benefit to their countries.

Recommendations

The meeting recommended that:

1. The approach taken by the Joint FAO/IAEA Division's Animal Production and Health Section should be maintained. A full time regional officer should be maintained in Vienna. Increased funding should be sought to meet the needs of countries in terms of continued rinderpest surveillance.

2. All of year 2 objectives should be completed by participating countries by December 1996.

3. All participating countries should try and improve their communications to achieve better coordination.

4. Mass vaccination should continue (where funds are available), however, where conditions are suitable countries should cease vaccination and start down the OIE pathway. Contact with the FAO EMPRES programme based in Rome is recommended to examine the types of assistant available to facilitate a cessation of mass vaccination.

5. A training course on ELISA should be organized in 1997.

6. The use of rinderpest vaccine to protect sheep and goats against PPR is not recommended. An homologous PPR strain should be used as a vaccine and the situation for obtaining the French/UK strain of PPR should be clarified.

7. The threat of rinderpest from Pakistan and Afghanistan is fully recognized. A mechanism for the active participation of these countries in the regional project should be sought.

8. Ear punching of vaccinated cattle is recommended (although its limitations are recognized).

9. Some mechanism must be sought to include countries of the region who are not members of IAEA in the activities of the project.

10. The next meeting should take place in Jordan.

(6) FAO/IAEA Regional Training Workshop on "Use of Immunoassay and Related Techniques for Studies on Animal Production in Africa", Radioisotopes Application Division, Egyptian Atomic Energy Commission, Cairo, Egypt, 13-25 April 1996

This training workshop was organized under the framework of the African Regional Co-operative Agreement for Research, Development and Training related to Nuclear Science and Technology (AFRA). The objective of the course was to provide some basic and advanced information on nutrition and reproduction and their interactions in ruminant livestock. The course participants were trained in the use of nuclear and related techniques to monitor livestock nutritional and reproductive indices. Emphasis was placed on the review of recent developments in reproductive physiology and nutrition in ruminants, collection, processing and storage of milk and blood samples, radioimmunoassay for measuring progesterone in blood and milk and analysis and interpretation of research data.

The course was attended by 16 participants from 12 AFRA Member States: Algeria, Cameroon, Ethiopia, Ghana, Kenya, Libya, Madagascar, Morocco, Nigeria, Tanzania, Tunisia, Zambia and Egypt. It was opened by Prof. Hissam Ali, President of the Egyptian Atomic Energy Authority.

Local arrangements were handled by the Course Director, Prof. Ibrahim Issa Ibrahim and the organizing committee from the Nuclear Research Centre of the Egyptian Atomic Energy Authority. Both accommodation and training facilities provided by the Desert Development Project of the Nuclear Research Centre were excellent and we would like to thank the host institute, the local and expatriate lecturers and staff, and in particular the Course Director and his organizing committee for their assistance in conducting this workshop.

(7) National Training Course on "Use of Immunoassy Methods for Animal Disease Diagnosis and Control", Ulaanbataar, Mongolia, 3 - 21 June 1996

The objective of this national course was to provide veterinary diagnosticians in Mongolia with training in the ELISA and its use in livestock disease control programmes. The course was aimed at young technicians and scientist involved in disease control programmes in Mongolia, and not at those in managerial and administrative positions.

The course concentrated on three diseases and involved specific ELISAs for these:

- The indirect Bovine Leucosis ELISA
- The indirect Brucella ELISA
- The competitive rinderpest ELISA

As well as extensive practicals, there were lectures on basic immunolgy, epidemiology and the control of Brucellosis and Enzootic Bovine Leucosis in peri-urban dairy herds and on the eradication of Rinderpest. A full report on the course will be given in the next Newsletter.

(8) Second FAO/IAEA Regional Training Workshop on "Improving Animal Production Through the Application of Feed Supplementation Strategies and Immunoassay Techniques", Kandy, Sri Lanka, 17 - 21 June 1996

The Workshop held under the FAO/IAEA Regional Technical Cooperation Project on "Feed Supplementation Strategies and Animal Production in Asia and Pacific Region" (RAS/5/030) was organized as a follow-up to the first workshop on the same subject under this project in January 1995 in Jakarta, Indonesia, at which an unified strategy was agreed upon to assist with the extension and popularization of supplementary feeding of Urea Molasses Multi-nutrient Blocks (UMMBs). Workplans were formulated to study the impact of UMMBs supplementary feeding on production and reproduction in dairy cattle.

The objectives of the second workshop under the project were as follows:

- to review the accomplishment of objectives targeted during the first workshop under the project;
- to review the progress in implementation of the Regional Asia project, RAS/5/030;
- to assess the impact of supplementary feeding of UMMBs on production and reproduction in dairy cattle in various participating countries;
- to exchange information and share field experiences between the counterpart scientists from different countries in the region, and
- to formulate future workplans for the project.

Thirteen scientists from eight countries, i.e. Bangladesh, P.R. China, Indonesia, Pakistan, The Philippines, Sri Lanka, Thailand and Vietnam attended the Workshop. Dr.

J.C.P. Plaizier from the University of Guelph, Canada, Dr. Rene Sansoucy from FAO, Rome, and Dr. A. Singh Nanda of the Joint FAO/IAEA Division assisted in the meeting's deliberations. A full report on the workshop will be given in the next Newsletter.

(D) STATUS OF EXISTING COORDINATED RESEARCH PROGRAMMES

(1) Development of Feed Supplementation Strategies for Improving the Productivity of Dairy Cattle on Smallholder Farms in Africa

This Programme has 13 Research Contracts and 5 Research Agreements and no further awards can be considered. The Second RCM was held in Rabat, Morocco, from 1 - 5 April 1996, and the final RCM is planned for 1998.

(2) Development, Standardization and Validation of Nuclear-based Technologies for Measuring Microbial Protein Supply in Ruminant Livestock for Improving Productivity

This programme has 5 Research Contracts and 4 Research Agreements and no further awards can be considered. The first RCM will be held at the Gadjah Mada University, Jogyakarta, Indonesia, from 5 - 9 August 1996.

(3) Use of Immunoassay Methods for Improved Diagnosis of Trypanosomiasis and Monitoring of Tsetse and Trypanosomiasis Control Programmes in Africa

This programme has 15 Research Contracts and 4 Research Agreements and no further awards can be considered. The first RCM is being planned for 9-13 September 1996 in Dakar, Senegal. Research Agreement holders from the University of Glasgow, from the Centre for Tropical Veterinary Medicine in Edinburgh, from the International Livestock Reseach Institute (ILRI) in Nairobi and from the Département d'Elevage et de Médecine Vétérinaire (CIRAD-EMVT) in Montpellier will be invited to attend.

(4) Development of Supplementation Strategies for Milk producing Animals in Tropical and Sub-tropical Environments through the use of Nuclear and Related Techniques

The programme has 17 Research Contracts and 6 Research Agreements and the final RCM is planned for early 1997.

(5) Improved Diagnosis and Control of Foot-and-Mouth Disease in South East Asia Using ELISA-based Technologies

This programme has 10 Research Contracts and 3 Agreements. A Technical Contract has been awarded to the World Reference Laboratory, Pirbright, UK, for the supply of FMD reagents. The 2nd RCM is planned to be held in The Philippines in February 1997.

(6) The Use of ELISA for Epidemiology and Control of Foot-and-Mouth Disease and Bovine Brucellosis in Latin America

This programme has 5 Research Contracts dealing with Foot-and-Mouth Disease and 5 dealing with brucellosis. There are 4 Research Agreement holders in the programme. The final RCM will take place at the VIC, Vienna, in early 1997.

(7) Improvement of Ruminant Livestock Productivity in Developing Countries Through the Use of Progesterone RIA to Increase the Efficiency and Quality of Artificial Insemination Services

This programme has 12 Research Contracts. The award of two further Research Contracts, three Research Agreements and a Technical Contract is pending. The Second RCM will be held in early 1997.

(8) Surveillance of Rinderpest in Africa - Phase III

OAU/IBAR/PARC has finally secured funding from the EU to establish an integrated rinderpest epidemiology function within the PARC coordination unit. This epidemiology project implemented by FAO is essentially a continuation and expansion of the seromonitoring network which was established under a SIDA-funded Co-ordinated Research Programme. The funding which was delayed since the termination of the SIDA-funded project in November 1993 has now been finally agreed and the project started on 1 June 1996.

It will be jointly operated from PARC headquarters through Dr. P. Rossiter and from the Section in Vienna through Dr. R. Geiger (as an FAO/IAEA CRP). 22 Research Contracts in 22 African countries and four Research Agreement holders have been approved and the first RCM will be held in Bamako, Mali, from 4 - 8 November 1996 (provisional).

(E) DEVELOPMENTS AT THE ANIMAL PRODUCTION UNIT, SEIBERSDORF

1. General

We are pleased to announce the appointment of Dr. Mark Robinson as the new Head of the Animal Production Unit effective 28 May. Dr. Robinson comes to us from the Agricultural Research Service of the U.S. Department of Agriculture where his research interests for twelve years included the development of diagnostic techniques for transmissible spongiform encephalopathies such as sheep scrapie and bovine spongiform encephalopathy. He has conducted research on retroviruses of domestic animals as well as contributed to research programmes on herpesvirus and hemoparasite diseases. Dr. Robinson earned a Ph.D. in anatomy and cell biology from the University of Washington School of Medicine (Seatle) in 1984 and finished his veterinary medical training (D.V.M.) more recently at the Washington State University College of Veterinary Medicine (Pullman).

Readers of the last NEWSLETTER will recognize that Dr. Robinson actually has been with the Unit since last September when he came to Vienna on sabbatical leave to help introduce new molecular diagnostic techniques to the Section and Unit. Although he and his family intended to stay for only one year, his work with Unit and Section staff and his growing interest in the Joint FAO/IAEA Animal Production and Health Programme played

major roles in his decision to accept the Unit Head appointment and stay at Seibersdorf. We welcome Dr. Robinson, and hope that his time here will be enjoyable for him as well as productive for our counterparts.

One of the factors which contributed to Dr. Robinson's decision to accept the Unit Head position was the very positive influence and interactions with Dr. Richard Jacobson of the Cornell University College of Veterinary Medicine. Dr. Jacobson served as Acting Head of the Animal Production Unit from August 1995 until February 1996. During his tenure, Dr. Jacobson was able to develop and promote many new projects and improvements to existing activities. Among other things, he oversaw the establishment of the new molecular biology facility, worked with Unit and Section staff to improve the protocols for reagent and supply procurement, inventory maintenance and kit shipments. Dr. Jacobson returned to USA in February, but his contributions to the programme will be felt for many years to come.

While serving as Acting Unit Head, Dr. Jacobson was able to recruit the assistance of Dr. Susan Sutherland, Co-ordinator of Biotechnology, Department of Agriculture, Western Australia, as a Consultant on quality assurance issues. During her five-week consultancy, Dr. Sutherland developed uniform standardized operating procedures (SOPs) for many of the activities, and produced the outline of a Quality Manual for the Unit which is the first step towards bringing the Unit's laboratory activities in line with International Standards Organization (ISO) Guidelines. Although Dr. Sutherland has returned to Australia, her work is being carried on by other staff members in an effort to improve our services to you, and we thank both Dr. Sutherland and Dr. Jacobson for their guidance in this important activity.

In the Unit's role as an O.I.E. Collaborating Centre for ELISA and Molecular Techniques in Animal Disease Diagnosis, Dr. van der Eerden represented the Joint FAO/IAEA Animal Production and Health Programme at the biannual meeting of the O.I.E. Standards Commission in Paris during February. She reported that compilation and editing of the third edition of the *OIE Manual of Standards for Diagnostic Tests and Vaccines* is near completion and the *Manual* will be printed and available from the O.I.E. near the end of 1996.

2. Applied Research and Service Functions

2.1 Indirect Antigen ELISAs for Enzootic Bovine Leukosis, Brucellosis and Babesiosis

The laboratory activities were aimed primarily towards quality assurance and standardization aspects of new batches of biological reagents required for diagnosis of the various diseases. The biologicals, as well as updated manuals were incorporated into the indirect antibody ELISA kits for diagnosis of enzootic bovine leukosis, brucellosis and babesiosis. These are now ready for distribution to contract holders.

2.2 RIA kit for progesterone

2.2.1 DPC kit supplies

To-date in 1996, 150,000 assay units have been dispatched to 56 laboratories in 44 countries. Seventy per cent of these kits were for measuring milk progesterone concentration, the rest were for plasma progesterone measurement.

As you may be aware, the DPC kits have a new format - new antibody and a different radioisotopic conjugate. How well end-users are finding this kit will be assessed through the 16th EQC service which was initiated in June. Please return your completed data sheets before the indicated deadline; also, let us know how you like the new kit-compared with the old along with your reasons why. The results of the last EQC exercise (No. 15) using the "old" DPC kits were sent to you recently and the general report on the exercise is recorded elsewhere in this Newsletter. *Please remember to discard all old DPC antibody-coated tubes (and old tracer).*

An incubation time of 3-4 hours was recommended previously for the new DPC kit (at temperatures of 18-25°C). However, our R&D at the Laboratory has indicated that the incubation time can be reduced considerably; a technical paper describing the new findings will be forwarded to each end-user in the near future.

2.2.2 FAO/IAEA self-coating kit for progesterone

Fifteen laboratories are currently in receipt of the self-coating kits. These kits provide the end-user with a greater degree of self-reliance and allow samples to be analysed at a time convenient to the researcher rather than a time dictated by the arrival of kits from Vienna. Recent comparative trials between the DPC and self-coating kits conducted in various locations indicated that the progesterone values derived are comparable although the self-coating kit gave a P4 value approximately 1 nmol/L lower than the DPC kit. The Unit is currently undertaking trials to better define international bovine standards for progesterone in milk and serum.

3. Quality Assurance Programmes

3.1 External Quality Assurance Programme

In the last NEWSLETTER an extensive article was written about the EQAP. The importance of participating in an Quality Assurance Programme was discussed.

The regulations as set out by the veterinary authorities, national governments, international organizations such as the Office International Epizootics (O.I.E.), World Trade Organization (W.T.O.), and the European Union concerning national and international trade and movement of livestock and livestock products are directing diagnostic laboratories to establish a Quality System and to implement Quality Standards for all of their activities in an effort to establish EQUIVALENCY in all aspects of livestock trade.

EQAP consists of three equally important components:

- the Questionnaire
- the monitoring of the Internal Quality Control (IQC) Data
- the External Quality Control (EQC) test panel of 5 test samples.

The EQAP is conducted twice per year. After successful completion of two successive rounds of the EQAP, the individual laboratory will receive recognition for their competence in performing the FAO/IAEA ELISA for a specific disease(s). This will enable the laboratory to give an assurance to any outside interested body that the ELISA results produced in that laboratory are valid.

Moreover, the EQAP is a tool to assist Member States in establishing a laboratory Quality System and to implement Quality Standards for all laboratory activities. The EQAP will enable participants to identify areas for improvement within their laboratories and to monitor the use of a Quality System. Although for the present the EQAP is focused on the FAO/IAEA ELISA kits, the concept of Quality Assurance is applicable for all activities within a laboratory.

3.1.2 The EQAP for the FAO/IAEA competitive rinderpest ELISA

The first round of the EQAP for the competitive rinderpest ELISA started in October 1995. In this EQAP round, 23 laboratories participated (22 laboratories on the PARC network and the OIE Reference Laboratory for rinderpest). The results have been analyzed and the participants have been sent the interim EQAP report.

3.1.3 General results

Of the 23 laboratories, 17 submitted completed Questionnaires, 13 submitted IQC data and 13 sent results of the EQC panel. The information and results are discussed and analyzed in the EQAP interim report. The other "non-responding" laboratories were not able to participate for reasons beyond their control. These laboratories will participate in the next round. Two laboratories returned the results too late for incorporation in the interim EQAP report; they will receive an individual evaluation of their results.

3.1.4 Conclusions and recommendations

The main conclusions and recommendations of the first round of the EQAP for the competitive rinderpest ELISA were:

(a) Analysis of Questionnaire:

Maintenance and calibration of equipment and the routine monitoring of the IQC data need improvement in most laboratories. Guidelines will be prepared as part of the EQAP to facilitate this.

The implementation of routine monitoring of the IQC data by the person conducting the ELISA will be a major objective of the EQAP in the near future. Simple, practical Control charts are being developed which will enable test-operators to record IQC data on a routine basis. At a later stage, the monitoring of the IQC data will be computerized.

(b) Analysis of IQC evaluation of the individual laboratories:

The majority of the laboratories showed good test results. The IQC data were within the Upper and Lower control limits and showed acceptable repeatability. However a few laboratories need to reduce variation in their IQC results. The most likely causes for this variation of the IQC data are discussed in the report.

(c) Analysis of the EQC test panel results:

Only two laboratories wrongly identified one weak positive sample of the EQC test panel as negative, indicating a 97% agreement between the participating laboratories. Therefore, the chance that positive sera are tested negative by any laboratory is low.

(d) The EQAP service:

To ensure success of the EQAP service it is vital that participating laboratories keep to the defined time limits, i.e. for confirming receipt of the EQC test panel and for returning results. If a laboratory foresees problems in keeping to the set time limits, it is essential that the EQAP coordinator is contacted immediately.

(e) Targets:

The target is a 100% return of the results from all participating laboratories. This will involve extensive communication between the counterparts and EQAP coordinator.

As the EQAP becomes more routine for all involved, it is expected that a higher percentage of returned results will be achieved. Also it is expected that the time limits will become easier to adhere to.

(f) Confidentiality:

All information submitted by the participating laboratories remains confidential. Each laboratory will be assigned an individual code number.

(g) Future EQAP rounds:

The next EQAP round for the FAO/IAEA rinderpest ELISA is planned for June 1996, and will also include the WAREC countries.

3.1.5 The EQAP for the FAO/IAEA indirect brucella ELISA

The EQAP for the indirect brucella ELISA started in November 1995. The EQAP interim report is being written at the moment (May 1996). A total of 31 laboratories in Asia, Africa and South America are participating in this EQAP round.

3.1.6 The EQAP for the FAO/IAEA Foot-and-Mouth Disease ELISA

The EQAP for the Foot-and-Mouth Disease indirect sandwich ELISA (antigen detection) and liquid phase blocking ELISA (antibody detection) will start in July 1996. The

first EQAP round will concentrate on the countries using the FAO/IAEA ELISA kits in Asia. The counterparts will be contacted by the EQAP coordinator soon to inform them about the EQAP.

3.1.7 The EQAP for the trypanosomosis Antigen capture ELISA

The EQAP for the trypanosomosis ELISA will start in September this year. The counterparts will be contacted by the EQAP coordinator soon, to inform them about the EQAP.

For further information on the EQAP or relevant literature concerning Quality Assurance/Quality Systems within testing laboratories, please contact: Dr. Barbara van der Eerden, Animal Production Unit, FAO/IAEA Agriculture and Biotechnology Laboratory, Agency's Laboratories, A-2444 Seibersdorf, Austria. Fax: +43 1 2060 28222; E-mail: eerden@rial1.iaea.or.at

4. Trypanosomosis Antigen Capture ELISA

The shipment of FAO/IAEA Trypanosomosis Direct Antigen ELISA kits to 15 Research Contract holders, and to Zanzibar (IAEA Technical Co-operation project on tsetse fly eradication from the island using the sterile male technique) was completed at the beginning of 1996. At present, the various Research Contract holders are using the kit to monitor on-going tsetse control programmes. The research results will be presented and discussed during the Research Coordinated Meeting being planned for September 1996 in Dakar, Senegal.

Meanwhile, the monoclonal antibodies directed against *T. congolense* and *T. vivax* supplied with the ELISA kit are being continuously assessed for diagnostic sensitivity and specificity. Studies are being conducted currently under experimental conditions at the APU in close collaboration with ILRI. Preliminary findings have indicated an excellent specificity of the test, but a sensitivity that needs further improvement. Several approaches are being considerd at APU and collaborating laboratories to meet the objective.

(i) It has been decided to incorporate monoclonal antibodies into the immunoassay which are derived from serum-free cell culture medium followed by high grade purification rather than murine ascetic fluid. This might help to avoid potential interference between trypanosomal antigens and non-specific antibodies derived from murine ascites, thus causing poor diagnostic sensitivity of the immunoassay. Therefore, various serum-free cell culture media have been evaluated for the propagation of hybridoma cell lines producing the monoclonal antibodies for the kit. So far, the first batch of IgM antibodies against the *T. brucei* antigen has been produced *in vitro* and will be available for studies to improve the sensitivity of the test. Similarly, bulk production of *T. congolense* IgM has recently started. It is planned to complete the *in vitro* production of *T. vivax* IgG_1 before the end of the year.

(ii) In addition, studies are focused on using monoclonal antibodies other than the ones presently used in the kit. The monoclonal antibodies have been provided by ILRI,

Nairobi. The investigations include using a combination of different monoclonal antibodies for capturing and detecting the trypanosomal antigens present in the bovine serum samples. The studies also involve monitoring *T. congolense* and *T. brucei* infections in experimental animals in collaboration with the Justus-Liebig University at Giessen, the Institute of Tropical Medicine at Antwerp, and the Free University of Berlin.

(F) PUBLICATIONS

Printed

IAEA-TECDOC-Proceedings of the Final FAO/IAEA Research Coordination Meeting on "Development of Feed Supplementation Strategies for Improving Ruminant Productivity on Smallholder Farms in Latin America Through the Use of Radioimmunoassay Techniques".

In Press

Proceedings of the Final Research Coordination Meeting of the SIDA-funded CRP entitled "Immunoassay Methods for the Diagnosis and Epidemiology of Animal Diseases in Latin America", Guadeloupe, May 1994.

Programme Memorandum of the Programme to Clarify and Solve the Problem of African Trypanosomiasis.

In Preparation

IAEA-TECDOC-Proceedings of the FAO/IAEA Epidemiology Workshop on "Monitoring of Tsetse and Trypanosomiasis Control Programmes", Ethiopia, 17 - 28 April 1995.

(G) ANIMAL PRODUCTION & HEALTH SOFTWARE PROGRAMS

1. ELISA programme, EDI Vers. 2.11

A number of counterparts were or will be supplied with new ELISA readers with internal filter wheels. It came to our notice that in some of these readers the filters are not in the correct positition which will result in too low OD readings.

When EDI is operated its system setting has to be configured for the correct type of ELISA reader. There are two options for ELISA readers available, the Multiskan MCC/340 MK II and the Multiskan MK II. This is equivalent to the two basic types of ELISA readers in the Multiskan range. The Multiskan MK II represents the type of ELISA reader where the filter has to be changed manually by sliding it in into a filter slot. The Multiskan MCC/340 MK II represents those where the filter is placed on an internal filter wheel and the filter is selected automatically.

If you have an ELISA reader with an internal filter wheel, you have to select the Multiskan MCC/340 MK II and the selection of the filter will be done by EDI. The selection

of the the Multiskan MCC/340 MK II should work with the following ELISA readers which have an internal filter wheel: Multiskan MS Vers. 4, Immunoskan Plus (If it has an internal filter wheel) and the MCC/340 MK II.

When a filter is selected in EDI, the computer sends a command to the reader and the reader selects the filter according to its position on the filter wheel.
Usually there are 8 filters on the filter wheel and they are positioned as follows:

Position 1, Filter 340
Position 2, Filter 405
Position 3, Filter 414
Position 4, Filter 450
Position 5, Filter 492
Position 6, Filter 540
Position 7, Filter 620
Position 8, Filter 690

If your reader is only equipped with 3 filters (e.g. 405, 450, 492) they are most commonly positioned at position 1,2 and 3. Thus, if you select EDI filter 405 the reader will select position 2 on the filter wheel. However, in some ELISA readers filters are placed in different positions and, for example, the filter with 450 nm might be positioned there. This will result in incorrect (mostly too low) OD readings since clearly the wrong filter is being used.

How to resolve this problem?

First the machine has to be opened and the filters set on the correct position on the filter wheel according to the positions outlined above. This will leave several positions empty.

Then the new position of the filters has to be entered into the software used to set up the ELISA reader. This is done on the ELISA reader with a key called "parameters". Use the up and down arrows to select among the various options and select the option "filter wheel". Set the number of filters in the ELISA reader to **8 filters** although there might be in reality only 3 filters present. **This is essential** as otherwise the reader will give a filter initialisation error message if you select in EDI the filter 492 e.g. position 5.
Reassign the position of the filters in the ELISA reader (e.g. position 1 filter 340, etc., position 5 filter 492 etc.,.....) according to the positions described above.

With three filters (e.g. 405, 450, 492) you will now have the following configuration. In the position 2, 4, 5, there will be the filters 405, 450, 492 respectively. The other positions will be empty. However, note that the ELISA reader is configured for 8 filters.

Once the filters have been assigned on the filter wheel and their positions set, you can use EDI in the MCC 340 mode to operate the ELISA reader. For example, if you now select the 492 filter using the programme you will get the correct filter as position 5 will be selected in the reader by the programme.

SID Version 3.0

The first field trials with the new developed epidemiological package, SID 3.0 have been completed. Valuable recommendations were gathered and most of these have been incorporated in the programme. Most of the extra inputs required were for the Disease and Serological Surveillance database as part of the Global Rinderpest Eradication Campaign. The final distribution of the SID 3.0 will take place once the Rinderpest Sero-monitoring and Rinderpest Surveillance database are complete (in about 2 months).

The SID programme for Foot-and-Mouth Disease and Brucellosis is under development and the first field trials are planned for the second half of this year.

(H) GEOGRAPHICAL INFORMATION SYSTEMS FOR ASSESSING TRYPANOSOMIASIS CONTROL & ERADICATION PROGRAMMES

The rapidly increasing human population of sub-Saharan Africa and the population flow from rural to urban areas is creating tremendous changes in land use and will have significant effects on future agricultural activities. Disease distribution patterns will be affected by these changes, and initiated disease control programmes will require re-evaluation Trypanosomosis control and eradication programmes have been relying on parasitological, serological and entomological methods for monitoring. However, in order to analyse the geographical and environmental implications of disease interventions it will be necessary to use sophisticated computer programmes. A Geographical Information System (GIS) is a computerised data management and analysis system, which can visualise the interactions of various data sets, such as climatic data, geographic data, human and animal population data, vegetation data. Moreover, GIS can be used to map disease distribution when geo-referenced data are available. Using GIS one can assess the effects of disease interventions on various other parameters measuring land use, animal distribution or the environment. Similarly, the influence and dynamics of changes in disease incidence can be predicted and disease risk maps can be produced for various geographical sites.

It is intended to start a new research project integrating disease data sets with data sets on climate, land cover, tsetse, human population and livestock density for selected African countries (Zimbabwe, Cameroon, United Republic of Tanzania, etc.). The data set integration will be carried out by a newly appointed Associate Expert from Kenya, who is expected to join the Section in August.

(I) NEW SUPPORT TO CLARIFY AND SOLVE THE PROBLEM OF AFRICAN TRYPANOSOMIASIS

A new initiative in the control and eradication of African Trypanosomiasis (PAT) aims to bring together all those concerned with and affected by this uniquely African disease; ranging from rural communities to governments, international organisations, research institutes, donors and development agencies. As a result FAO, IAEA, OAU/IBAR and WHO have agreed to join forces in the fight against trypanosomiasis in Africa by forming a joint Programme Secretariat. The PAT Committee sat for the first time in Brussels from 1-2 April 1996.

This initiative follows from a series of consultations with experts, member nations and donors who stressed the need for coordination at the international level in order to provide the required impetus and direction to research, policy definition and implementation activities.

The Programme has four main components. Overall responsibility rests with the Programme Committee which, with the support of the Joint Secretariat, aims to define and regularly review activities and progress. Membership includes representatives of interested donors and senior technical advisors.

At the technical level, two Modules bring together all those involved in practically orientated Research and Development on the one hand and Policy makers, Planners and Implementors on the other. These Modules will facilitate dialogue and coordination on all trypanosomiasis activities within the context of agricultural development.

Within the Modules specialists are encouraged to interact in topical Advisory Groups. The list of the different Groups and their Coordinators is provided below. On the basis of the information generated, the Programme Committee will make recommendations on the best use of existing resources and on the priority areas for action.

Those wishing to be informed of the Programme in more detail, and/or to be involved in its activities, are invited to contact the Joint FAO/IAEA Division, being a member of the Secretariat.

List of Advisory Group Coordinators

Land-use and environment

Dr. D.J. Rogers:	Impact of disease and disease control on land use and environment
Prof. P. Nagel:	Impact of insecticides on land use and environment

Socio-economics

Dr. B.M. Swallow:	Disease impact, in socio-economic terms, on rural development

Vector management

Dr. S. Mihok:	Bait techniques research and development; East and Southern Africa
Dr. B. Bauer:	Bait techniques research and development; West and Central Africa
Mr. R. Allsopp:	Bait techniques implementation; Southern and East Africa
Dr. A. Douati:	Bait techniques implementation; West and Central Africa
Dr. I. Maudlin:	Vector management; techniques other than bait attractants
Mr. W. Shereni:	Vector management; Tsetse behaviour and ecology

Diagnosis and epidemioloy

Dr. R. Dwinger:	Diagnosis and epidemiology of animal trypanosomiasis
Dr. V. Nantulya:	Diagnosis and epidemiology of sleeping sickness

Host management

Dr. L. Dempfle:	Host management through trypanotolerance utilisation
Dr. A. Teale:	Trypanotolerance; research and development

Parasite management and disease control

Dr. S. Geerts:	Parasite management for animal trypanosomiasis
Dr. F. Ekwanzala:	Parasite management for sleeping sickness

Strategies and planning

Dr. R. Connor:	Strategies and planning for animal and human trypanosomiasis control in East and Southern Africa
Dr. C. Laveissiere:	Strategies and planning for human and animal trypanosomiasis in West and Central Africa

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