ANIMAL PRODUCTION AND HEALTH NEWSLETTER

Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture and FAO/IAEA Agriculture and Biotechnology Laboratory, Seibersdorf

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CONTENTS

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TO THE READER

Dear Colleague,

As we begin this new millennium, both IAEA and FAO have taken the opportunity to look carefully at the way they do business. In the last Newsletter, I outlined the changes in management of our programmes that are now taking place - if you recall, the switch is one from focusing on what was completed to focusing on the result. For example, not that we held a particular consultants meeting is important, but what was the outcome of the meeting and the impact in Member States. In jargonistic terms, we have moved from an output or activities based programming to one based on results. With your help and feedback through the questionnaire on our animal production activities we have come a long way in developing a new medium term strategy based on this approach. We are carrying out a similar exercise for the animal health component of the Sub-programme and would ask you to look at the questionnaire on page 27 of this Newsletter. As with the previous one, we are relying heavily on your inputs to enable us to best meet your needs. If you can assist in this area, please take time to complete this questionnaire and return it to us.

Similar changes are also occurring in the planning and execution of the Technical Co-operation Programme of the Agency. This year we evaluate your Technical Co-operation (TC) Project proposals for the next TC biennium of support (2001–2002). As with the regular budget funded programme, we will do things differently and hopefully better. Those of you familiar with our Technical Co-operation Programme will know that in the past three years we have begun three new initiatives: the thematic programmes, the country programme frameworks, and the model project concepts. The thematic programme approach is still in its infancy but already some six major themes have been developed, which cut across regions and will provide a more holistic approach to addressing a common problem faced by Member States for which the Technical Co-operation Programme could provide a solution. Many Member States have developed country programme frameworks and TC Project proposals should now fit into these allowing for focused and national prioritized projects to be preferentially supported. Finally, the TC model project principles that were applied to a few projects in the previous two TC biennium cycles are now being applied to almost all project proposals both in terms of appraisal and planning. Logical frameworks, technical work plans and performance criteria are now prepared as part of the proposal and examined and refined, if necessary, during the appraisal process. It is anticipated that this will create a greater understanding of what has to be achieved, what are the likely problems and risks, and an earlier identification of the need for project adjustments. During the months of April and May, the Technical Officers in this Sub-programme have appraised some 70 TC project proposals and applied (as much as possible these new management principles).

Such changes in approach are not confined to IAEA but also to FAO, and we have spent some time developing our FAO Medium Term Strategy (MTS). As most of you are aware we work "hands in glove" with the Animal Production and Health Division in FAO Headquarters Rome and this seamless partnership has been fully recognized in our FAO MTS. However, the development of this has given the opportunity for us to identify other areas within FAO where synergies and interdependencies can or should occur. This exercise, therefore, will considerably improve the effectiveness of our support to you.

I have taken time to recount these reforms to you for two reasons. Firstly, I would like you to appreciate that we really are trying to improve how we do things, to give a better service to you and to do more with less. Secondly, because ultimately we are here to assist you and we would like your feedback and comments on these changes and whether they improve and increase our support to you. I would, therefore, greatly appreciate any comments, good or bad, that you have on how things were done, the changes we are making, and the changes that you might be seeing as 'our customers'. This brings me to highlight a particular aspect of our programme development that is of particular concern. While the link through FAO to its Member States and the opportunities offered through the Joint FAO/IAEA Division are relatively clear we do not have a formalized approach to gaining the views of the IAEA Member States, and particularly our counterparts in the specialized disciplines. In the case of this Sub-programme, we are dealing with agriculturists and

veterinarians. The IAEA annual General Conference and the continual, almost daily, contact with National Atomic Energy Commissions permit an excellent dialogue on nuclear energy matters. These forums do not always enable views of other 'stakeholders' in IAEA Member States. We need to improve this dialogue and we look to you to seek ways to do this. The questionnaire in this Newsletter is one way to achieve this but there are others. Again, I would greatly welcome your comments and suggestions on this critical issue.

Before concluding, I should mention some staff changes. As mentioned in the last Newsletter, Mark Robinson, the Head of the Animal Production Unit, left in November 1999. The vacant position has been extensively advertised and we hope to appoint someone new towards the end of this year. Meanwhile, we have been extremely lucky to secure the temporary services of Mario Garcia to assist in the day-to-day running of the Unit. Mario, as many of you will know, was with us for some seven years as a Technical Officer in the Animal Production and Health Section and is ideally suited to fill this gap and assist us.

Finally, please do take time to look at the various on-going activities described in this Newsletter and please feel free to write back to us (or E-mail, phone or fax) with any comments, enquiries or suggestions you have.

With best wishes,

M. H. Jeggo

Martyn Jeggo
Head, Animal Production and
Health Section

The Animal Production Unit, Seibersdorf, is a collaborating Center for ELISA and molecular technologies in animal disease diagnosis for both the OIE and WHO

A. STAFF

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

Joint FAO/IAEA Division

James D. Dargie	Director	
Manase P. Salema	Deputy Director	

Animal Production and Health Section

Martyn H. Jeggo	Head of Section	M.H.Jeggo@iaea.org
Axel Colling	Technical Officer	A.Colling@iaea.org
John Crowther	Technical Officer	J.Crowther@iaea.org
Ron Dwinger	Technical Officer	R.Dwinger@iaea.org
Harinder Makkar	Technical Officer	H.Makkar@iaea.org
Oswin Perera	Technical Officer	O.Perera@iaea.org
Anita Erkelens	Associate Professional Officer	A.Erkelens@iaea.org
Andrea Gervelmeyer	Associate Professional Officer	A.Gervelmeyer@iaea.org
Daniel Ezeokoli	Sabbatical	D.Ezeokoli@iaea.org
Secretaries		
Roswitha Schellander		R.Schellander@iaea.org
Rosario Léon de Müllner		R.Leon-de-Muellner@iaea.org

FAO/IAEA Agriculture and Biotechnology Laboratory, Animal Production Unit of the Agency's Seibersdorf Laboratory, A–2444 Seibersdorf, Austria

Christopher J. Rigney	Head, Agriculture and Biotechnology Laboratory	
To be filled	Head, Animal Production Unit	
Dierk Rebeski	Technical Officer	D.Rebeski@iaea.org
Axel Colling	Technical Officer	A.Colling@iaea.org
Mario Garcia		M.Garcia@iaea.org
Mutasem Khadra	Laboratory Technician	M.Khadra@iaea.org
Herbert Haas	Laboratory Technician	H.Haas@iaea.org
Mamadou Lelenta	Laboratory Technician	M.Lelenta@iaea.org
Beata Rogovic	Laboratory Technician	B.Rogovic@iaea.org
Eva-Maria Winger	Laboratory Technician	E.Winger@iaea.org
Secretary		
Anna Schirnhofer		A.Schirnhofer@iaea.org

B. FORTHCOMING EVENTS

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

Technical Officer: Oswin Perera

This meeting will be held from 12 to 16 June 2000 in Uganda. The objectives are to review the results obtained and the experiences of project counterparts in the use of the computer database AIDA (Artificial Insemination Database Application) for recording, analysing and reporting field and laboratory data. The meeting will also formulate plans and future strategies for using a unified approach to data management and decision support in AI services in AFRA Member States.

GREP Workshop on Improving and Harmonizing Rinderpest Diagnosis and Surveillance

Technical Officer: Andrea Gervelmeyer

This FAO GREP Workshop will be held from 6 to 14 July 2000 the Laboratoire Central Vétérinaire in Bamako, Mali.

The purpose of the Workshop is to examine and harmonize the various indirect and competitive ELISAs for the detection of antibodies to rinderpest. At the Workshop, the different assay formats and their standard operating procedures will be introduced and work plans for further testing of assay robustness in their respective laboratories will be agreed upon. Conclusions as to the validity of the assays in the various scenarios shall be agreed and recommendations for supporting the assays shall be given. The Workshop will be attended by six representatives from African and Asian diagnostic laboratories as well as representatives of the World Reference Laboratory for Rinderpest, Pirbright, CIRAD/EMVT, University of Davis, California, and IAEA.

Second RCM on "Assessment of the Effectiveness of Vaccination Strategies Against Newcastle Disease and Gumboro Disease Using Immunoassay-based Technologies for Increasing Farmyard Poultry Production in Africa" (D3.20.19)

Technical Officer: Ron Dwinger

The Second Research Co-ordination Meeting on "Assessment of the Effectiveness of Vaccination Strategies Against Newcastle Disease and Gumboro Disease Using Immunoassay-based Technologies for Increasing Farmyard Poultry Production in Africa" will be held from 4 to 8 September 2000, at the Sokoine University in Morogoro, United Republic of Tanzania. The purpose of the meeting is to present the national characteristics of family poultry production in each country and to identify production constraints. Each Research Contract holder obtained data from 24 village poultry farmers during two field surveys (during the dry and the wet season) in his/her country using a standardized format. The results have been analysed and will be presented by each participant during a 15-minute lecture. In addition, the most appropriate interventions to improve family poultry production in each region will be discussed and identified. Twelve Research Contract holders from as many African countries as well as a representative from the Joint FAO/IAEA Division are expected to attend the meeting. A number of experts from Nigeria, Tanzania, Morocco, Denmark, United States of America and the Netherlands will assist in providing scientific advice and observers have been invited from FAO, Mozambique and the United Kingdom.

Workshop Establishing Quality Systems in Veterinary Diagnostic Laboratories

Technical Officer: Axel Colling

A consultants meeting linked to a TC Workshop is planned from 4 to 15 September 2000, at the FAO/IAEA Biotechnology Laboratory in

Seibersdorf and IAEA Headquarters, Vienna, Austria.

The main objective of the consultants meeting is to prepare training material, "generic" guidance documents and standard operating procedures to assist the counterpart laboratories move down a QA pathway leading to international accreditation. The linked TC Workshop will 'train the trainers' in the use of this material.

Workshop on Rinderpest Sero-monitoring and Surveillance in Africa Using Immunoassay Technologies in conjunction with an FAO/IAEA consultants meeting (RAF/5/043)

Technical Officer: Andrea Gervelmeyer

This Workshop is scheduled to be held from 18 to 22 September 2000 in Garoua, Cameroon. Its objective is to highlight the progress made in moving down the OIE pathway and to identify areas of rinderpest epidemiosurveillance that need further strengthening. During the Workshop, the experience in different countries with planning and implementing of active disease- and sero-surveys as well as the analysis of field and laboratory results will be discussed. Recent developments in research on rinderpest assays with special emphasis on the problem of rinderpest lineage II detection will be presented. The Workshop will be attended by 20 participants from African diagnostic laboratories and representatives of FAO, PACE and IAEA. Invitations for nominations of suitable candidates will be sent out to Member States soon.

Project Co-ordination and Mid-term Review Meeting of the AFRA Project on "Increasing Milk and Meat Production" (RAF/5/046, AFRA II-24)

Technical Officer: Oswin Perera

The meeting will be held from 6 to 10 November 2000 in Tunis, Tunisia. The objectives are to review the results obtained from field and laboratory activities under the project, including recording of AI services and background data, analysis of progesterone by RIA, interpretation of results and feed-back to AI services providers and farmers. The meeting will formulate work plans for future project activities and will determine the inputs required from Member States and IAEA.

Final Review Meeting of the AFRA Project on "Development and Field Evaluation of Animal Feed Supplementation Packages" (RAF/5/041, AFRA II-17)

Technical Officer: Harinder Makkar

The meeting will be held from 25 to 29 November 2000 in Cairo, Egypt. The objectives of the meeting will be to evaluate the progress of the work conducted and to formulate recommendations and conclusions.

General Information for Training Courses/Workshops

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

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

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

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

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

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

C. PAST EVENTS

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

Technical Officer: Oswin Perera

This meeting was held from 22 to 26 November 1999 and was hosted by the Taurus Stock Improvement Co-operative, Pretoria, South Africa. It was attended by six project counterparts from AFRA Member States (Algeria, Morocco, South Africa, Tanzania, Tunisia and Uganda) and was supported by an IAEA expert (Dr. David Galloway, Australia) and the Technical Officer.

The objectives of this meeting were to (a) review the programmes and protocols currently in use for training of AI technicians (AITs) in AFRA MSs and selected countries in other regions; (b) identify ways of improving the contribution and commitment of AITs to the provision of more effective breeding and other support services to cattle farmers, including the needs for continuing education; (c) develop a unified and regionally acceptable programme for the training of AITs and for their effective contribution to the improvement of AI services and development of livestock production in the African region; and (d) identify the basic requirements of a database management system for recording, analyzing and reporting field and laboratory data which would facilitate the use of progesterone RIA in conjunction with AI services, for improving reproductive management by farmers and for providing a service for early diagnosis of non-pregnancy and infertility in cattle.

Following presentations by the participants, the expert and the Technical Officer, a SWOT analysis was performed. Based on the analysis, conclusions were made on the current status and future needs. Recommendations were then formulated for addressing these needs. Finally, technical protocols were drafted to serve as guidelines for implementing the improvements in training programmes, data recording, analysis and feedback of results to farmers and other end-users.

The meeting concluded that the adoption of these guidelines by AFRA MSs will result in a more harmonized approach to training, data management and operation of non-pregnancy diagnosis (N-PD) and related services to farmers based on progesterone RIA. It was recommended that future activities should include an assessment of the costs and economic benefits of N-PD services under different cattle production systems. The full meeting report, containing conclusions, recommendations, technical protocols and guidelines, is available from the Animal Production and Health Section.

FAO GREP Consultants Meeting on Rinderpest Lineage 2

Technical Officer: John Crowther

A consultants meeting took place from 2 to 3 February 2000 in Vienna, Austria, and was attended by four experts from UK, France, Kenya and FAO as well as staff of the Animal Production and Health Section and the Animal Production Unit of the Agency's Laboratories, Seibersdorf.

There has been a growing debate centering on the currently-used competitive ELISA based on a monoclonal antibody (MAb) against the H protein of RBOK rinderpest virus. The main concern has stemmed from various field and experimental data linked with African Lineage 2 rinderpest virus. Some results have indicated that the test may not measure antibodies against this lineage of virus as efficiently as compared to those produced against the vaccine strain. Hence, the use of the test in sero-surveillance has been put in doubt.

An essential step in the eradication of rinderpest is to verify freedom by ceasing vaccination and then surveying for possible residual infection by active disease search supported by serological studies. In order to endorse tests for routine use, it is vital to understand their efficacy in detecting antibodies against all possible strains of rinderpest. Many countries are in the process of surveying for antibodies after cessation of vaccination and have moved from sero-monitoring (essentially detection of antibodies against the vaccine strain) into sero-surveillance (detecting antibodies against possible field strains). Advice is required for all involved in GREP on the strategies which should be employed in surveillance for rinderpest; this includes not only the designing of statistically-based sampling frames but also which assays can be used and for what purpose.

The meeting sought to review the possible problems encountered with African Lineage 2 rinderpest virus infections and offer solutions and guidance for regulatory veterinary authorities and laboratories involved in assaying antibodies against rinderpest in the context of surveillance for the disease. The meeting, therefore, drew on the data of key workers engaged in studies of morbillivirus epidemiology, pathogenesis and immunology. The meeting also served to widen the discussion to consider current developments in assays which might be available for the detection of rinderpest, and thus increase the possibilities for overcoming current and possible emerging problems associated with the final stages in the eradication of rinderpest.

A full report of the meeting, including conclusions and recommendations was made to FAO, OIE, EU, OAU/IBAR, IAEA through the Joint FAO/IAEA Division.

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

Technical Officer: Oswin Perera

The meeting was held from 14 to 18 February 2000 at the Metro Inn, Kajang, Kuala Lumpur, and was hosted by the Malaysian Institute of Nuclear Technology (MINT) and the Malaysian Agricultural Research and Development Institute (MARDI). It was attended by all 21 nominated project counterparts and two additional project collaborators from 11 RCA Member States (Bangladesh, P.R. China, India, Indonesia, Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam) and was supported by one IAEA expert (Dr. Noble Jayasuriya, Sri Lanka) and the Technical Officer.

The full meeting report, including agenda, achievements, conclusions, recommendations and work plans for both project components are available from the Animal Production and Health Section. The main conclusions and recommendations are summarized below.

Component 1: Nutritional Supplementation

It was concluded that the project had resulted in better utilization of low quality feed resources for ruminant feeding in all participating MSs and that the supplementation strategies developed, particularly Urea Molasses Multi-nutrient Blocks (UMMB), had proven valuable for use by smallholder as well as semi-commercial farmers. During 1999, over 1.6 million kg of UMMB were fed to over 25 000 animals (cattle, buffalo, yaks, and goats) by 6200 farmers associated with the project. The modalities developed for extension of the technology had been enhanced,

consolidated and extended through strengthened linkages between collaborating institutes, national livestock agencies, farmer organizations and NGOs. Over 145 national training activities were conducted for field extension personnel and farmers, amounting to over 5400 man-days of training. Exhibitions, demonstrations, publication of leaflets in local languages and educational programmes through mass media have also been conducted widely. Four MSs have established micro-financing schemes for farmer groups, in the form of a revolving fund for UMMB manufacture. There is good potential in other countries also for such ventures, to promote sustainability of this technology and to generate employment and income for village women and youths. Interest has been shown by private commercial companies to produce UMMB in several countries. There is a need to further refine the different formulae for specific species, production levels and purposes, and to introduce new methods for evaluation and incorporation of unconventional feed resources into existing strategies. This includes methods for exploiting tanniniferous plants in ruminant diets and the use of urine purine derivative analysis as a means of assessing nutritional adequacy.

It was recommended that participants should implement the work plans developed and include an assessment of the cost-benefit of supplementation in the final report, which should be prepared in the form of a scientific and technical paper suitable for publication as an IAEA–TECDOC. The first draft of the report should be submitted by 15 October 2000 and the final draft by 15 December 2000 for presentation at the next meeting to be held in early February 2001 in the Philippines. The proposal, which has been submitted for an extension of the project, to introduce new technologies for assessment and incorporation into ruminant diets of non-conventional feeds such as tree leaves, shrubs and other agro-forestry by-products, which do not compete with human food, is fully supported and endorsed. The detailed work plans for such an extension should be discussed and agreed upon at the meeting in February 2001. The extension phase should also focus on the establishment of micro-financial systems such as revolving funds for farmer groups to undertake production and distribution of proven supplementation packages in a sustainable manner. The possibility of using UMMB as a vehicle for introducing additives (e.g. enzymes, ionophores, yeast and anthelmintics) to improve productivity, through rumen manipulation and control of parasites, should be explored. The linkages established with government agencies, farmer co-operatives and NGOs should be further improved and consolidated and funds from these and other local as well as international sources should be actively sought for further extension of current technologies and introduction of new modalities.

Reproductive management and AI

It was concluded that progress has been good in all participating MSs who joined the project at the beginning of 1999. Those joining the project later have the necessary capability to participate effectively in project activities. All MSs in the former category have either completed the field survey to determine current status and identify constraints or are progressing well towards its completion, while those in the latter category need a further 8–10 months to complete the survey. All MSs have functioning RIA laboratories to support the programme and five MSs have already commenced the use of Self-coating RIA (Sc-RIA) for routine assay of progesterone. All counterparts, except recent nominees, have successfully installed and used AIDA for recording and summarizing data, and confirmed that it is a useful tool for the initial survey on AI programmes and for identifying problems. However, most counterparts expressed the need to simplify and adapt AIDA for subsequent routine use. One MS has used the RIA for non-pregnancy diagnosis (N-PD) with limited success. An important pre-requisite for this is a more frequent supply of RIA reagents, particularly radioactive tracer, possibly from a regional source. All MSs confirmed that RIA in conjunction with clinical examination had good potential for application in determining causes of infertility and for adopting effective treatment protocols. Several MSs identified a need to develop a uniform approach to evaluation of breeding bulls and quality control of semen used in AI.

It was recommended that all MSs should complete the field survey by October 2000 and identify the major constraints by December 2000. The next meeting to review progress and discuss future work plans should be held in early February 2001 in the Philippines, for which the first draft of the progress report should be submitted by 15 October 2000 and the final draft by 15 December 2000. The AIDA computer application should be adapted and customized to suit the needs and circumstances of Asian MSs to routinely monitor and evaluate results from AI

programmes and as an aid to decision-making by national AI services. This should be addressed through a regional Task Force meeting that could be hosted by Sri Lanka during April 2001. The procedures currently used by different Asian countries for evaluation of breeding bulls should be standardized and unified protocols developed for ensuring quality control of semen during processing, storage and field use. This should be accomplished through a regional Workshop which could be hosted by Bangladesh or Pakistan during August 2001.

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

Technical Officer: John Crowther

The first Research Co-ordination Meeting (RCM) of the FAO/IAEA Co-ordinated Research Project (CRP) D3.20.20 on the "Use of non-structural proteins of foot-and-mouth disease virus (FMDV) to differentiate vaccinated and infected animals" was held from 20 to 24 March 2000 in Rio de Janeiro, Brazil. The meeting was attended by fourteen of the fifteen Research Contract holders and all six Research Agreement holders as well as representatives of United Biomedical Incorporated. The Research Contract holder from China could not attend but sent a comprehensive report.

Three sets of reagents were supplied in the first year. These were from:

- The Institute for Animal Health (IAH) Pirbright, UK / Istituto Zooprofilatico Sperimentale, Brescia, Italy - an Indirect ELISA based on 3ABC antigen expressed in *E. coli*.
- Veterinary Institute for Virus Research, Lindholm, Denmark - a competition ELISA based on 3A and 3B proteins expressed in baculovirus.
- United Biomedical Incorporated (UBI), USA - an indirect ELISA based on peptides (synthetic) 3B.

Three main groups in the CRP reflect various developmental states with regard to control of FMD. These are groups from South America, South East Asia and Africa. The needs of each group varied according to the extent of disease control and this theme emerged through the meeting.

The Research Agreement holders all made presentations. They represented reagent producers (Brescia/Pirbright; Lindholm, Denmark); Plum Island, USA (who discussed developments in use of non-structural proteins in ELISA), CSIRO, Geelong, Australia, and PANAFTOSA who discussed the developed non-structural ELISA based on 3ABC baculovirus expressed protein. UBI also presented data. Mr. Axel Colling, IAEA, gave presentations on EQA, and laboratory accreditation developments under the OIE.

Areas discussed included continuous validation of kits, harmonization of kits, comparison of analytical sensitivities, establishing diagnostic sensitivities, identification and collection of reference sera, establishing reference serum panels, internal quality control charting methods, previous exercises in comparing assays, inclusion of the PANAFTOSA kits in future exercises, and supply of future reagents in terms of changes to protocols as well as establishing costs for the kits.

From the data shown and discussions during the meeting, it was concluded that:

- There were differences in diagnostic sensitivities of the assays, as illustrated by differing results with serum from animals early after infection or late after infection.
- The diagnostic specificity of each of the tests was similar.
- There were some difficulties with the indirect ELISAs not being efficient at picking up sera from specific species of animals, e.g. buffalo sera in the Philippines and giraffe sera in South Africa.
- The test from Denmark required a truly competitive format to achieve higher diagnostic sensitivity.
- All information from the assays should be routed trough the TO in Vienna and sent to all involved in the CRP.
- The ELISA devised in PANAFTOSA should be included in some laboratories for parallel testing.
- An estimation of the relative analytical sensitivity of each assay should be made.

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

Technical Officer: Harinder Makkar

The third RCM was held from 20 to 24 March 2000 at the University Putra Malaysia, Selangor, Malaysia, to assess the progress of the work conducted and to develop procedure(s) to assess the impact of the techniques developed. It was attended by eight Research Contract holders, six Research Agreement holders and the Scientific Secretary of the Project.

Recommendations and Conclusions

General Conclusions

1. Phase II of the project has been progressing well. The provision made by the IAEA to extend this programme for a 1–2 year period enabled the participants to further evaluate the potential of the urinary purine derivative (PD) excretion methodology, and to complete the process of establishing the protocols, including colorimetric techniques, for the effective use of the PD-technique in the field.

2. Progress made so far has re-affirmed with greater confidence that the PD excretion technique is a simple and practical method for predicting the rumen microbial protein supply in ruminant livestock. It has proved to be a powerful technique that is being increasingly used in a variety of research programmes. The PD excretion method has the advantage of being non-invasive, simple to use and inexpensive and gives a good prediction of microbial out-flow from the rumen.

Standardized methods and procedures, outlined in the laboratory manual (IAEA–TECDOC–945) have enabled the participants to carry out their experiments confidently and produce results that are scientifically valid. In addition, the document, outlining procedures to ensure that analytical determinations are uniformly standardized in the laboratories of all participants and that the data generated are reliable, has been of considerable use to all participants and has introduced a quality assurance ethos into the programme.

Specific Conclusions

PD excretion

Studies carried out with Indonesian Ongole cattle, Malyasian Kedah-Kelantan (KK) cattle (*Bos indicus*), Chinese Yellow cattle, Turkish Yerli Kara cattle, Chilean Friesian (*Bos taurus*) cattle, different local populations of sheep and goats (Zimbabwe) and camels (Morocco) re-affirmed the value of the PD excretion method. There was a significant linear increase in PD excretion with digestible organic matter intake (DOMI), confirming that PD excretion can be confidently used for predicting the microbial protein supply. Most values ranged from 15–21 mmol/kg DOMI. Evidence was also presented that it could be used to predict energy intake in animals for which dry matter intake is not known.

Studies by Malaysian and Indonesian Research Contract (RC) holders indicated that equations relating PD excretion (Y, mmol/d) and the absorption of purine bases (X, mmol/d), previously reported for buffaloes and KK cattle should be modified as follows:

$Y = 0.115 X + 0.99$ (r^2=0.994) – for buffalo

$Y = 0.846 X + 0.28$ (r^2=0.956) – for KK cattle

Based on the response of PD excretion to feed intake, the equations previously reported for zebu breeds are acceptable.

Unlike in cattle, sheep, goats and camel, the PD excretion per unit DOMI was much lower and more variable in buffaloes, suggesting lower sensitivity of the PD excretion method as an indicator of the microbial protein supply in buffaloes.

The proportion of plasma PD to be excreted in the urine can theoretically be affected by the glomerular filtration rate (GFR). In two studies in sheep, it was observed that GFR increased with level of feed intake, but within each animal individual variation in GFR did not influence the rate of PD excretion in urine. Whether the low PD excretion rate observed in buffalo compared to cattle was due to differences in GFR needs to be examined. It was stressed that until different physiological mechanisms for purine absorption and PD excretion are fully understood, the method based on PD excretion cannot be recommended for buffaloes. Research aimed at understanding these mechanisms will be undertaken during the forthcoming period 2000–2001.

Studies using ^{14}C and ^{15}N

Studies in cattle using labelled ^{14}C- and ^{15}N-uric acid in Phase I and duodenal infusion of ^{14}C-uric acid in Phase II indicated that there is a consistent linear relationship between duodenal purine base (PB) flow and urinary excretion of PD,

confirming the response of PD excretion in relation to DOMI in this species. Trials with buffaloes confirmed previous observations that they are different from the other species in relation to purine metabolism.

Determination of creatinine excretion

An almost constant excretion of creatinine (C) from different animal species with varying DOMI, when expressed on metabolic weight, confirmed that it can be used as an internal marker for estimating the urinary volume. However, the variability in the excretion of this compound needs to be further evaluated as there were some inconsistencies. The indicative values for C excretion (mmol/kg$W^{0.75}$/d) for cattle or buffalo were 0.8, and for sheep or camel 0.4. These need to be further validated in relation to feed intake and physiological status of the animal. These studies will be carried out in the remaining period of the CRP.

Spot urine sampling

It is generally not practical to collect urine quantitatively in the field. Therefore, experiments conducted during the CRP indicated that 'spot urine sampling' technique can be used in practice. Analysis of urinary PDs combined with C determination gave similar predictions of microbial out-flow from the rumen to those obtained with complete urine collection. For example, the relationship between PD/C ratio (X) in urine and total PD excretion (Y, mmol/d) in urine were: $Y= 26.1 X + 57.2$ ($n=20$, $r^2 = 0.58$) for Ongole cattle in Indonesia and $Y= 0.367 X + 19.02$ ($n=24$, $r^2 = 0.59$) for KK cattle in Malaysia. More quantitative data will need to be established in the forthcoming period of the CRP.

Recommendations

1. Despite the strong indications that spot urine samples provide a consistent relationship between PD:C and total PD excretion, more research is needed to determine the optimum sampling protocol and to study whether the physiological status of the animal and its feed management affect this relationship.
2. All RC holders should continue to follow the analytical procedures described in the quality assurance document to ensure high degree of confidence in all experiments. The standards required for the analysis of urine/plasma for allantoin, C and uric acid should be distributed to all RC holders from one location, preferably from the Agency's Laboratories, Seibersdorf. The stability studies on these standards should be conducted by one of the Research Agreement holders (Dr. P. Susmel has kindly agreed to conduct these studies). Based on these studies the protocols for preparation of the standards for the distribution should be developed.
3. A feed intake versus PD excretion response model for camel be established in accordance with the protocols given in IAEA–TECDOC–945 before the PD excretion or PD:C ratio is used for prediction of rumen microbial out-flow in this species. It would be desirable if a Research Agreement holder could assist the Moroccan group working on camels in establishing these methodologies.
4. More research should be undertaken on the buffalo to (i) determine reasons to the observed differences in purine metabolism and its possible implications on other metabolic processes, and (ii) detect alternative urinary compounds for estimating microbial synthesis in the rumen.
5. The RC holders, who have not been able to obtain a reliable relationship between PD excretion and DOMI for their local livestock, should continue to work towards achieving this. The relationship between PD excretion and DOMI for camels should also be re-evaluated.
6. The Final RCM of this CRP should be held towards the first half of 2002, preferably in Vietnam. The deadline for submission of the manuscript for publication is 30 December 2001.

Third Asian Buffalo Congress

FAO/IAEA Participants: Oswin Perera and Harinder Makkar

The Third Asian Buffalo Congress was organized by the Sri Lanka Veterinary Association on behalf of the Asian Buffalo Association, in collaboration with the Ministry of Livestock Development and Estate Infrastructure, the Sri Lanka Association for Animal Production, the National Science Foundation and the University of Peradeniya. It was held from 27 to 31 March 2000 in Kandy, Sri Lanka.

The IAEA was a co-operating organization and provided financial support for the attendance of five leading scientists from the Asian region.

The Congress was attended by some 150 participants, including around 25 foreign delegates, mainly from Asia (India, Iran, Malaysia, Pakistan, Thailand and Vietnam) and two from Europe (Bulgaria and Italy).

The Congress comprised four Plenary Sessions, seven Symposia and one Round Table Conference, with a total of some 50 scientific papers. The topics included buffalo production systems, genetics and breeding, reproduction, nutrition, diseases, biotechnology, product technology and marketing. A field visit was made by the foreign participants to a large buffalo breeding farm, while the local participants attended a Training Workshop on "Technical, marketing and trade issues". Oswin Perera delivered a keynote lecture entitled "Modern reproductive technologies: their potential application for improving buffalo production in Asia", chaired a Plenary Session on "Buffalo production systems", delivered a lecture on "Use of hormones for the control of reproduction in cattle and buffaloes" at the Training Workshop for local participants and moderated the final session on "Conclusions and recommendations". Harinder Makkar delivered a keynote lecture entitled "Some recent developments in the evaluation and utilization of unconventional feed resources" and chaired a Symposium on "Buffalo nutrition". A brief summary of the current status, trends and future needs discussed during the congress is given below.

Farming systems: The traditional production systems in many Asian countries are changing in response to pressures of increasing human population, decreasing land availability and consumer demands. The emerging systems are focusing on dairy and beef production with draught as a subsidiary output. The comparative advantage of the buffalo over cattle lies in its ability to better utilize marginal lands and coarse roughage, and to produce high-fat milk and low-fat meat.

Breeding: There is an increasing demand in most countries for quality breeding buffaloes. This requires appropriate breeding strategies, improvements in artificial insemination (AI), establishment of progeny and performance testing schemes and conservation of genetic resources.

Reproduction: Low reproductive efficiency is mainly due to poor nutrition and management. AI coverage needs to be increased, together with improved heat detection, timing of breeding by AI and follow-up pregnancy diagnosis. New technologies need to be suitably adapted for field application and disseminated through education of livestock service providers and farmers.

Nutrition: Supply and quality of feeds limit production. Utilization of local feed resources needs to be optimized. Strategic supplementary feeding with Urea Molasses Multi-nutrient (UMM) formulations, tree fodders, agro-industrial by-products and selected minerals have potential for wide application. Purine Nitrogen Index (based on excretion of purines and nitrogen in urine) and Partitioning Factor (based on partitioning of substrate to short chain fatty acids, gases and microbial protein *in vitro*) have the potential for assessing the efficiency of conversion of feeds to microbial protein in the rumen.

Health: The major problems are calf mortality, haemorrhagic septicaemia and foot-and-mouth disease. Biotechnological methods need to be applied for development of new diagnostic methods and vaccines. Routine services for testing milk and meat for residues and contaminants need to be established.

Milk and Meat: Technologies have been developed for commercial liquid (UHT) and powdered buffalo milk. There is a need for improvement of small-scale village-based technologies and for vertical integration of production, processing and marketing. A demand exists for de-boned frozen buffalo meat and action is needed to promote and facilitate international trade.

The main areas of future research and development requiring biotechnological and molecular methods were identified as manipulation of rumen microbes and the fermentation process; embryo transfer, selection and related technologies for genetic improvement; and development of diagnostic methods and vaccines for diseases.

The Fourth Asian Buffalo Congress will be held in India in 2002.

Consultants Meeting on "Identification of Research Needs for Quantification of Nutrient Budget and Flows in Integrated Crop/Livestock Systems with a Focus on Conservation and Sustainability Issues in Developing Countries"

Technical Officer: Harinder Makkar

The meeting was held from 2 to 14 April 2000 in Vienna, Austria. It was attended by four consultants with expertise in nutrient dynamics and staff of the Animal Production and Health, and Soil and Water Management & Crop Nutrition Sub-programmes of the Joint FAO/IAEA Division.

Background and rationale

One of the greatest challenges faced by mankind is to satisfy the nutritional needs of the rapidly expanding global population while, at the same time, preserving biodiversity and land, water and air resources. Livestock are an important part of the agricultural landscape in terms of outputs of food, fuel and fibre. Livestock produce diverse food products, provide security, complement crop production systems, and generate cash incomes for rural and urban populations, provide fuel and transport, and produce goods that can have multiplier effects and create a need for services. Furthermore, livestock diversify production and income, provide year-round employment and spread risk. There is a rapidly growing demand for livestock products worldwide, as human population pressure and incomes increase, and as dietary habits change. Changes in land use and human population are now leading to intensification and expansion in many types of livestock production systems.

Re-utilization of nutrients on-farm has been a normal practice for centuries. However, the relevance of research in the fields of nutrient stocks, flows, and management has increased due to massive population growth, industrialization, decrease in availability of arable land, development of high-input livestock systems, increased use of mineral fertilisers, high demand for livestock products as a result of growing world economies and globalisation of trade.

In developing countries, people currently consume an average of 21 kg/capita of meat and fish and 40 kg/capita of milk equivalents as against 100 kg/capita of meat and fish and 178 kg/capita of milk equivalents in developed countries. By 2020, people living in developing countries are projected to consume an average 38% more meat and 62% more milk per capita than in early 1990s. The increased livestock population required to meet this demand may worsen environmental problems. This calls for development and introduction of systems which are economically, socially and ecologically sustainable. In mixed farming systems, in particular integrated crop/livestock systems, livestock play a central role in creating more sustainable farming systems. The ruminants are of particular importance in this context since they can be raised on crop residues, agro-industrial by-products and low quality roughages, which do not compete with human food. In addition, integrated crop/livestock systems, at present, provide 90% of the milk, 77% of the ruminant meat, 47% of pork and poultry meat and 31% of the eggs.

Animal protein intake in developing countries has increased sharply over the past decades and this trend is expected to continue.

The increasing demand for animal products is outstripping population growth. In many parts of the tropics, both ruminant and human populations are increasing rapidly. Increasing food production in the regions means an increasing production of crop residues and agro-industrial by-products and, depending on management, this could be used not only to sustain the increased animal numbers but also to increase efficiency of animal productivity.

As a result of these changes, new pressures on the environment are developing or could emerge and should, therefore, be of concern. It is increasingly clear that livestock-environment linkages should be seen in the context of human, economic and political aspects as well as natural resource utilization. These challenges demand a flexible and dynamic approach in the development and formulation of policies for the livestock sector. The scale and nature of the interaction between livestock production and the environment has been the subject of much speculation and debate. A technical basis for making balanced policy decisions and for formulating intervention plans is generally lacking. A paucity of precise information about ecosystems and their interactions with livestock enterprises can lead to erroneous decisions, particularly at the policy level, and to wrong interventions.

In the last few years, a number of organizations, namely FAO, the World Bank, USAID, ILRI, Netherlands Ministry of Foreign Affairs, EU, DANIDA of Denmark, BMZ of Germany, DFID, U.K., etc. undertook a major 'multi-donor study

on livestock-environment interactions'. The catalyst was the United Nations Conference on Environment and Development (UNCED) Meeting in Rio in 1991, which placed environmentally sustainable agriculture high on the international agenda. The 'multi-donor study' included an International Conference on Livestock and the Environment which issued a document containing state-of-the-art reviews. The following were identified as critical issues:

- Overgrazing and degradation
- Deforestation
- Wildlife and livestock interactions
- Upsetting the balance between crops and livestock
- Soil and water pollution
- Emission of greenhouse gases

The interactions between livestock and the environment are many and complex. Deforestation, soil erosion, reduced soil fertility, loss of biodiversity, water contamination, waste disposal and greenhouse and obnoxious gas emissions are some of the recognized environmental problems. Measures that tackle only the superficial effects of environmental damage will never be as effective as policies and interventions which attack the underlying causes.

Meanwhile, many livestock systems are severely under pressure. Free-range systems in Africa are increasingly pushed into marginal areas or have to share feed resources with game animals. The pastoralists of the recent past (Peulh, Masai) have recently turned to semi-sedentary forms of agropastoralism. At the same time, farmers in semi-arid Africa with mixed crop-livestock systems, which depend on communal lands for their grazing needs, see these lands declining in size and productivity. Animals are highly important to many resource-poor farmers. They provide meat, milk and draft power to subsistence farmers, are living bank accounts, and fulfil an array of social and gender-sensitive functions (e.g. provision of dowry).

The future of ruminant systems in the developing world is clearly in mixed crop-livestock systems, with a reasonable level of overall system productivity. For this to be achieved, a good understanding is needed of the existing fertility of the entire agro-ecosystem, of which the ruminant forms part, as well as the major nutrient flows that determine production (useful or marketable output), productivity (useful output per unit input) and sustainability (total outputs do not exceed total inputs). Hence, the challenge is to direct nutrient flows towards 'marketable output' as much as possible, to achieve the highest possible output per unit input (fertiliser, nitrogen fixed, labour), and to reduce leaching, erosion, gaseous losses and removal of residues from the system. Integration of system components can be used to increase nutrient use efficiency, improve household economics, and reduce the need for imported resources such as mineral fertilisers.

The role of ruminants in the larger agro-ecosystems of which they form part has been under-rated. Piece-meal research efforts on either soil fertility, forage quality, feed supplements, or increased nutrient use efficiency within the animal have not provided the necessary broader 'systems' picture that allows animal production to stand out as a vital component to recycle nutrients for increased production. Clearly, there are still knowledge gaps on how best to describe and mobilize the ruminant subsystem as part of these larger systems. Then follow the key questions. What is the best method to improve the productive potential of the system? What nutrient flows should be focused on?

The environment associated with livestock is under pressure. Free range pastoralists are finding it difficult to survive in increasingly harsh environments. At the same time, industrial livestock farmers may be responsible for environmental pollution and have to respond to tough legislation. The huge demand for animal products forces research efforts into the development of mixed crop-livestock systems that are productive (high outputs), clean (few non-useful outputs), efficient (high outputs per unit input) and sustainable (outputs do not exceed inputs). The challenge is to analyse the processes that determine the value of these indicators in different systems, and to design better management systems that are within reach of those who have to implement them. Use of stable isotopes is extremely useful in quantifying and tracing nutrient pathways, and in targeting further research on nutrient flows where there are opportunities for improvement.

Poor animal production resulting from protein deficiency, and poor management of excreta from ruminant animals contribute to poor nutrient cycling in many agricultural systems. As cropping intensities increase in response to increasing population pressures, greater amounts of crop residues are potentially available to ruminants,

but the time and labour available to manage these residues for animal production becomes increasingly limited. Improving the feed conversion efficiency through strategic supplementation with farm grown protein sources offers scope to enhance animal production, lower environmental polluting gases such as methane and carbon dioxide, and to improve the efficiency of nutrient cycling in the food crop sector.

A technical basis and sound quantitative data for formulating guidelines and intervention plans are lacking. A complete knowledge of farming systems and their nutrient inputs/outputs, flows and potential for loss will assist the farmer in his decision to efficiently utilize nutrients and optimize production.

Recommendations and conclusions from the meeting

1. A joint CRP entitled "Integrated Nutrient Management to Improve Productivity and Sustainability of Ruminant/Cropping Systems in Tropical Africa and Asia" utilizing isotopes should be initiated in two contrasting agro-economic zones of the tropics, namely in irrigated rice based systems in South and/or South East Asia and in the semi-confined crop/livestock system in Africa.

2. The substantial comparative advantage of the Joint FAO/IAEA Programme in conducting integrated research and training programmes was noted by the consultants.

3. The objective of the CRP is to enhance animal and crop production through improved feeding strategies for ruminants and more efficient nutrient cycling in integrated ruminant /cropping systems.

4. Expected outputs from the CRP are given below.

a) Improved knowledge of nutrient cycling in integrated ruminant/cropping systems and strategies to enhance nutrient capture within the system.
b) Established guidelines for the management of livestock excreta, crop residues and low quality forages.
c) Increased capacity of NARS to integrate nuclear techniques into research programmes and to conduct inter-disciplinary research.
d) Published and disseminated research results.

5. Considerations for the selection of Research Contract holders.

a) Ideally the Contract holders should be involved in, or have access to, similar research to that proposed here so that nuclear techniques could be introduced to on-going studies to improve the definition of nutrient flows.
b) Linkages between scientists and/or institutions with expertise in soil fertility, agronomy and animal production is essential.
c) Supplementary funding from national/international donors should be available to enable the scale of the study to be sufficient to encompass the whole soil/ plant/ animal continuum.
d) Separate financial support should be given to soil and animal scientists operating at the same research site to enable the necessary integration to be accomplished.

6. The sites to be used should be representative of major agro-ecosystems in Africa and South and/or South East Asia. Because of the nature of the research, the experimental programme will need to be conducted on research or demonstration farms to ensure that both the initial and residual effects of enhanced nutrient cycling are evaluated.

7. Isotope techniques to be used in the CRP include:

a) ^{15}N and ^{34}S for nutrient dynamics studies to follow the pathways of nitrogen and sulfur in the soil/plant/animal continuum and to understand the mechanisms controlling transformations.
b) ^{13}C for constructing carbon budgets and to be able to determine changes in soil organic matter forms and contents.
c) ^{32}P or ^{33}P to estimate the efficiency of P utilization in legume production.
d) A Technical Contract to study the value in using ^{18}O as a surrogate for P should be awarded.

8. Contracts should be awarded to ten soils and ten animal scientists working in partnership in linked projects and jointly funded and managed from D1 and D3 Sub-programmes. A joint scientific secretariat should be appointed from the Soil and Water Management & Crop Nutrition Section and the Animal Production and Health Section.

9. A total of 5–6 Research Agreement holders should be appointed.

10. The first RCM should be held as soon as possible after award of Research Contracts and Agreements.

11. A combined one-week soils, animals and data management training programme should be held at the Agency's Laboratories, Seibersdorf, and Vienna University at the first RCM.

12. The CRP should be linked as far as possible to projects funded by other donor agencies and existing research networks.

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

Technical Officer: Oswin Perera

This Training Workshop was held from 8 to 12 May 2000 in Bangkok, Thailand.

The objective of the course was to develop regional expertise in the production of radio-iodinated tracer progesterone for use in the progesterone RIA.

A full report will be given in the next Newsletter.

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

Technical Officer: Oswin Perera

This Training Workshop was held from 22 to 26 May 2000 in Mauritius.

The objective of the course was to develop national expertise in the production of standards and internal quality control (IQC) samples and to further develop collaboration and co-ordination within the region to operate a network of RIA laboratories in a self-sustaining manner. A full account of the course will be given in the next Newsletter.

D. STATUS OF EXISTING CO-ORDINATED RESEARCH PROJECTS

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

Technical Officer: Harinder Makkar

This CRP is now in its second Phase. It has six new Research Contracts and two Research Agreements making in all nine Research Contract holders and six Research Agreement holders. The CRP is aimed at developing a method which can readily be used by farmer advisors or extension workers to identify major problems of nutrition that result in a grossly inefficient rumen digestion of feed and a low level of microbial supply to the host animal. The third RCM was held from 20 to 24 March 2000 at the University Putra Malaysia, Selangor, Malaysia, to assess the progress of the work conducted and to develop procedure(s) to assess the impact of the techniques developed.

For further details, please see report on page 11 of this Newsletter.

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

Technical Officer: Harinder Makkar

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

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

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

Technical Officer: Ron Dwinger

The CRP finishes in July 2000. It improved the infrastructure in fifteen African laboratories and facilitated the training of personnel in the diagnosis of trypanosomosis. Moreover, human resource development has enabled some Research Contract holders to act as regional experts. The project has successfully promoted ELISA as a generic technology in these institutes.

The research results and a number of review papers will be published in a Technical Document. The publication will be available upon request from the Animal Production and Health Section by the end of 2000.

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

Technical Officer: Andrea Gervelmeyer

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

This EU-funded CRP, conducted as part of the OAU/IBAR PARC programme, will cease in 2000. The co-ordination of the laboratory network established under this CRP will continue under the umbrella of the IAEA TCP RAF/5/043 in close collaboration with the EU-funded OAU/IBAR PACE programme.

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

Technical Officer: John Crowther

The CRP has now six Research Contract holders from Mali, Côte d'Ivoire, Ethiopia, Kenya, Namibia and more recently Korea.

Points stemming from work carried out in the CRP are summarized below:

- Training in association with good laboratory design has emerged as the most vital factor in establishing successful methods. The training should be on fundamental molecular biology so that full understanding of technical aspects is achieved. Loss of trained staff to commercial companies is a problem. Setting up a PCR laboratory and training are fundamental to begin work.
- An "agreed" protocol for PCR accommodating developments in equipment and basic reagents is being developed and tested in all laboratories linking with Research Agreement holders.
- Retention and parallel development of serological tests are vital.
- Reliance on PCR alone for diagnosis is dangerous.
- The key to successful work on PCR and elimination of contamination is initial laboratory design and rigid work practices. Elaborate procedures are needed involving discipline of workers, equipment maintenance and use and procedures for specific areas. Without this attention, there is great danger in contaminating the laboratory. Further dangers lie in improper monitoring of contamination.
- Many controls are needed to allow confidence in results.
- Special dangers with the performance of nested PCR have to be faced.
- Sequencing of products should be encouraged.
- Differential diagnosis should be regarded as a major use of PCR.

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

Technical Officer: Andrea Gervelmeyer

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

the competitive ELISA for the detection of antibodies to contagious bovine pleuropneumonia (CBPP) through field studies in different African countries. At the second RCM in Lusaka, Zambia, from 27 September to 1 October 1999 (see also under Past Events), first results of the longitudinal studies were presented. The work plans for further research work were agreed upon. Recently, the CSI have been requested to submit their mid-year progress report and a compilation of the reports presented at the RCM is being prepared.

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

Technical Officer: Ron Dwinger

The Second Research Co-ordination Meeting on "Assessment of the Effectiveness of Vaccination Strategies Against Newcastle Disease and Gumboro Disease Using Immunoassay-based Technologies for Increasing Farmyard Poultry Production in Africa" will be organized at the Sokoine University at Morogoro, United Republic of Tanzania, from 4 to 8 September 2000.

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

Technical Officer: John Crowther

The CRP is now 16 months old and has fifteen Research Contract holders and six Research Agreement holders. The CRP is examining three assays involving indirect and competitive ELISAs to allow discrimination of antibodies produced in livestock after vaccination or infection with FMD virus. Results using the three kits supplied are now available. A full report oft the first RCM in Rio de Janeiro is given on page 10 in this Newsletter.

E. NEW CO-ORDINATED RESEARCH PROJECTS

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

Technical Officer: Ron Dwinger

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

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

immune complexes masking the antigenic determinants recognized by the monoclonal antibodies used in the test.

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

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

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

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

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

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

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

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

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

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

Develop and Validate Improved Technologies Based on Molecular Methods for Diagnosis of African Swine Fever (ASF) Virus and Strain Differentiation

Technical Officer: John Crowther

There is no vaccine developed for controlling ASF and control, therefore, relies on rapid diagnosis, culling of infected animals, burying and chemical destruction of dead animals and rigid movement restrictions. The disease is spread by contact, contamination and by vectors. The latter scenario complicates control of the disease and a reservoir of virus is maintained. Other wild pigs species also maintain the disease since they carry the virus without symptoms and can infect domestic pigs. A variety of methods have been devised for diagnosis and surveillance of the

disease through detection of antigens and antibodies. The disease can be complicated clinically from the diagnosis point of view with Classical Swine Fever.

Primary diagnosis can be made using the immunofluorescence (IF) test, both direct antigen detection (DIF) and indirect IF (IIF) for antibodies should be used on the same sample. Samples include lymph nodes and spleen. This means that microscopes with UV illumination have to be available and training given to overcome subjective assessment of results. The antibody detection has to be performed simultaneously to allow detection of virus complexed to excess antibodies at stages in infection. The ELISA is also used either as the indirect assay for antibody detection or a capture assay for antigen. Immunoblotting techniques with coated cellulose strips are also used to confirm ASF antibodies. Recently PCR technology has been applied for antigen detection. Molecular characterization is also carried out at research institutes.

A major problem in the establishment of diagnostic capabilities is the lack of standardization of methods and supply of reagents. This is true for all the techniques. Coupled with this is a poor general understanding of the relevance of the tests, even those regarded as being well established, and when to use them. The newer technologies of PCR probe analysis and sequencing have not been fully exploited. This in turn is allied to the poor understanding of the implications of the disease particularly following an epidemic.

There is a need to consolidate both serological techniques and develop practical molecular biological tools to allow confirmation of diagnosis and also amplification of gene products and sequencing. The latter tool will allow confidence that the virus genome is absent following control programmes as well as the rapid assessment of strains, and it will also substantially increase the molecular epidemiological understanding of the spread of virus and also the indigenous strains in countries. Strains in wild life and arthropod vectors can be classified. This will require examination of primers and the best (most appropriate) systems of PCR that can be used in a number of laboratories in Africa. It will also require efficient methods for data base preparation and agreement on methods of analysis of results to allow epidemiological significance of data to be assessed. Such methods should also be assessed in parallel with serological techniques wherever possible. A network of laboratories receiving and analysing samples could be set up with agreed protocols and analytical methods, communicating data to all parties interested in ASF control.

The CRP will develop and validate improved technologies based on molecular methods for diagnosis of virus and strain differentiation. This will lead to more effective control and eventual eradication of the disease and provide methods to allow confidence that the disease is absent after control programmes, by examination of wild life and vectors. The introduction and standardization of such technologies will result in greater understanding of movement of ASF within and between countries in Africa, leading to development of better control strategies. The CRP will also act as a focus for African laboratories in the supply of strains for characterization and be the first time that active sequencing of the strains is made in Africa under African conditions. Parallel serological investigations, involving polyclonal and monoclonal antibodies, will also lead to a better understanding of the relationship between antigenicity and sequence variation. The overall impact will be the effective and sustained control of ASF in Africa.

Research background in ASF

Generally, there has been a severe run down in research on this disease. The methods used for serology based on polyclonal antibodies have not been fully developed nor standardized, and kits, which can be regarded as field validated, are not available. Although several laboratories have produced monoclonal antibodies (MAbs) against various structural proteins of ASF, again they have not been exploited to improve diagnostic tests (e.g. competitive assays), nor for antigenic profiling, which would be very useful for rapid strain differentiation. The latter technique using large panels of MAbs to identify epitope differences in ASF strains would be extremely valuable as a complementary test to sequencing of strains where gross differences in sequence may not be reflected in the antigenicity of proteins (sequence variation may not correlate with sequence variation). MAbs are still available and can be exploited in research in this CRP.

Previous methods of characterizing strains have centred on restriction endonuclease (RE) mapping. Molecular methods such as PCR are now fairly well established for a variety of primers for ASF. What is needed is to gather and

examine protocols, design primers sets and good controls and then set up a system for sequencing and interpretation of results. This requires expertise in the first place and computer support. The research element here is the design of primers for specific regions, overcoming sequencing anomalies, standardization of techniques and communication.

Possibilities of CRP

There are several relevantly situated laboratories in Africa with PCR experience. Since there is active interest in the disease now in many more African countries, there is a growing amount of material available for study and an increased need to evolve systems for examination of disease status following infection. The project is feasible in Africa, but will have to be limited to a few laboratories where existing facilities and training are already good. The area of molecular methods for confirmation of diagnosis, PCR amplification and sequencing to allow strain differentiation and comparison and exploitation of MAbs in serological assays, and the relative data obtained, should be concentrated on. Sequencing of material can be made in-house or be done through commercial sources.

Applications

Applications for Research Contracts are welcomed and further information can be obtained from J. R. Crowther in the Animal Production and Health Section.

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

Technical Officer: Martyn Jeggo

It has been decided to carefully review the activities to be undertaken under this CRP to ensure that it is in line with the rapidly changing needs and opportunities in this area of food quality monitoring. All those submitting proposals have been informed accordingly and a re-evaluation of submitted proposals will be undertaken in the coming months.

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

Technical Officer: Oswin Perera

The background to and objectives of this CRP were described in the previous Newsletter and have resulted in expressions of interest from a large number of prospective Research Contract and Research Agreement holders. Further information will be provided to all those who are interested as soon as funding is secured to initiate the project.

General information applicable to all Co-ordinated Research Projects

Submission of Proposals

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

Complementary FAO/IAEA Support

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

F. TECHNICAL CO-OPERATION PROJECTS

Current Operational Projects
(Number, Title, Technical Officer)

ALG/5/018, DIAGNOSIS AND CONTROL OF FOOT-AND-MOUTH DISEASE, John Crowther
ARG/5/010, IMPROVING TUBERCULOSIS DIAGNOSIS IN RUMINANTS USING PCR, Ron Dwinger
BGD/5/020, UMMB TO IMPROVE LIVESTOCK PRODUCTION AND REPRODUCTIVITY, Harinder Makkar
BOL/5/009, ANIMAL HEALTH IN EASTERN BOLIVIA, Ron Dwinger
BOL/5/011, BETTER NUTRITION TO IMPROVE PRODUCTIVITY OF ANDEAN LIVESTOCK, Harinder Makkar
CMR/5/009, NUCLEAR TECHNIQUES FOR IMPROVING LOCAL RUMINANT PRODUCTIVITY, Harinder Makkar
CMR/5/010, EPIDEMIOLOGICAL MONITORING OF CBPP, Andrea Gervelmeyer
COL/5/019, IMMUNOASSAY AND PCR TECHNIQUES IN DIAGNOSIS OF BRUCELLOSIS, Ron Dwinger
COS/5/022, IMPROVING BEEF CATTLE PRODUCTION, Oswin Perera
CPR/5/014, INCREASING PRODUCTIVITY OF CROP-LIVESTOCK PRODUCTION SYSTEMS, Harinder Makkar (Associate Staff)
CYP/5/017, MONITORING VETERINARY DRUG RESIDUES IN MEAT & DAIRY PRODUCTS, Martyn Jeggo
ETH/5/012, INTEGRATING SIT FOR TSETSE ERADICATION, Martyn Jeggo
INS/5/023, FEED SUPPLEMENTATION FOR INCREASING LIVESTOCK PRODUCTION, Oswin Perera
INS/5/029, SUPPLEMENTARY FEEDING AND REPRODUCTIVE MANAGEMENT OF CATTLE, Oswin Perera, Harinder Makkar
INT/2/010, QUALITY ASSURANCE IN ANALYTICAL/DIAGNOSTIC LABORATORIES, Axel Colling
IRQ/5/008, IMMUNOASSAY TECHNIQUE FOR RINDERPEST DIAGNOSIS, John Crowther
MAG/5/007, IMPROVING LIVESTOCK HEALTH AND PRODUCTIVITY, Andrea Gervelmeyer, Harinder Makkar
MAK/5/002, IMMUNOASSAY TECHNOLOGIES FOR DIAGNOSIS OF LIVESTOCK DISEASES, John Crowther
MAR/5/010, INCREASING MILK PRODUCTION FROM SMALLHOLDER DAIRY COWS, Oswin Perera
MLI/5/015, DIAGNOSIS AND CONTROL OF ANIMAL DISEASES USING ELISA AND PCR, Andrea Gervelmeyer
MON/5/007, IMPROVING LIVESTOCK PRODUCTIVITY AND HEALTH, John Crowther, Harinder Makkar
MOR/5/025, MONITORING ANIMAL DISEASES WITH NUCLEAR TECHNIQUES, John Crowther
MYA/5/009, MONITORING AND CONTROL OF FOOT-AND-MOUTH DISEASE, John Crowther
NIC/5/006, IMMUNOASSAY IN THE DIAGNOSIS OF ANIMAL DISEASES (PHASE II), Ron Dwinger
NIR/5/029, CROSS-BREEDING INDIGENOUS CATTLE TO IMPROVE MILK PRODUCTION, Owin Perera
PAR/5/007, ELISA FOR CONTROL AND ERADICATION OF ANIMAL DISEASES, Ron Dwinger
PAR/5/008, IMPROVING REPRODUCTIVE EFFICIENCY IN CATTLE, Oswin Perera
PER/5/022, NUCLEAR TECHNIQUES FOR IMPROVING ANIMAL PRODUCTIVITY, Oswin Perera
PER/5/025, MOLECULAR TECHNIQUES FOR ANIMAL DISEASE DIAGNOSIS & CONTROL, Ron Dwinger
RAF/5/036, INCREASING FOOD SECURITY IN SUB-SAHARAN AFRICA, Harinder Makkar, Associated Staff
RAF/5/041, ANIMAL FEED SUPPLEMENTATION PACKAGES (AFRA II-17), Harinder Makkar
RAF/5/043, ASSISTANCE TO COMPLETE ERADICATION OF RINDERPEST FROM AFRICA, Andrea Gervelmeyer, Martyn Jeggo, Mamadou Lelenta
RAF/5/046, INCREASING AND IMPROVING MILK AND MEAT PRODUCTION, Oswin Perera
RAS/5/030, FEED SUPPLEMENTATION AND ANIMAL PRODUCTION STRATEGIES, Oswin Perera
RAS/5/035, BETTER MANAGEMENT OF FEEDING & REPRODUCTION OF CATTLE (RCA), Oswin Perera, Harinder Makkar
RAW/5/004, SUPPORT FOR RINDERPEST SURVEILLANCE IN WEST ASIA, John Crowther

RLA/5/041, RIA TECHNIQUES IN ANIMAL PRODUCTION RESEARCH (ARCAL XXVIII), Oswin Perera
SAF/5/003, NATIONAL REFERENCE LABORATORY FOR VETERINARY DRUG RESIDUES, Martyn Jeggo
SAF/5/004, PIG IMPROVEMENT FOR RESISTANCE TO AFRICAN SWINE FEVER, John Crowther
SEN/5/025, SURVEILLANCE OF CBPP AND PPR USING IMMUNOASSAYS, Andrea Gervelmeyer
SUD/5/025, IMPROVING PRODUCTIVITY OF GOATS IN SUDAN, Oswin Perera
TUN/5/018, USE OF NUCLEAR TECHNIQUES FOR ANIMAL DISEASE DIAGNOSIS, John Crowther
TUR/5/021, FEEDING STRATEGIES & RIA TO INCREASE DAIRY CATTLE PRODUCTION, Oswin Perera
UGA/5/022, DEVELOPMENT OF AN IMPROVED CBPP CONTROL PROGRAMME, Andrea Gervelmeyer
URT/5/021, LIVESTOCK DEVELOPMENT IN ZANZIBAR AFTER TSETSE ERADICATION, Oswin Perera, Harinder Makkar
URU/5/021, RIA AS A TOOL TO IMPROVE MILK PRODUCTION IN SHEEP, Harinder Makkar, Oswin Perera
URU/5/023, IMPROVEMENT OF ARTIFICIAL INSEMINATION SERVICES USING RIA, Oswin Perera
VEN/5/020, ANIMAL NUTRITION AND PRODUCTIVITY (PHASE II), Oswin Perera
VEN/5/021, SUSTAINABLE ANIMAL PRODUCTION, Harinder Makkar
ZAI/5/013, IMPROVING ANIMAL DISEASE DIAGNOSIS, Andrea Gervelmeyer

G. QUALITY ASSURANCE PROGRAMMES

1) The FAO/IAEA External Quality Assurance Programme: Past, Present and Future

The FAO/IAEA external quality assurance programme is gradually evolving into a support programme to establish quality systems in veterinary laboratories. An essential element of this development is that counterparts have to recognize their responsibilities and take over the lead in implementing the technical requirements (e.g. QA/QC procedures and proper documentation, etc.) and management facilities (e.g. organization and management, quality system, etc.). The foundation for this approach is the new "OIE Standard for Management and Technical Requirements for Laboratories Conducting Tests for Infectious Animal Diseases" (see contents) which has been developed under the substantial inputs of counterparts, international expert panels and the co-ordination and guidance of the Animal Production and Health Sub-programme.

This document describes the OIE Standard for management and technical competence that serves as the basis for accreditation of laboratories that conduct tests for infectious animal diseases, especially those laboratories involved in testing for international trade. It contains the specific requirements unique to laboratories conducting tests for infectious animal diseases. These specific requirements represent an interpretation of the generally stated requirements of ISO/IEC[1] 17025:1999, General requirements for the competence of testing and calibration laboratories.

Accreditation bodies that recognize the competence of such testing laboratories may use this Standard as the basis for their accreditation. Laboratories that comply with the OIE Standard also operate in accordance with ISO/IEC 17025 with respect to testing for infectious animal diseases. Clause 4 specifies the requirements that a laboratory shall meet in order to demonstrate sound management. Clause 5 specifies the requirements needed to demonstrate technical competence and validity of results for the testing activities it undertakes.

OIE STANDARD FOR MANAGEMENT AND TECHNICAL REQUIREMENTS FOR LABORATORIES CONDUCTING TESTS FOR INFECTIOUS ANIMAL DISEASES

STANDARDS COMMISSION OF THE OFFICE INTERNATIONAL DES EPIZOOTIES

[1] International Organization for Standardization / International Electrotechnical Commission

Contents

The OIE Standard will also serve as a foundation document from which further interpretations and/or guides will be developed as required.

The need to control or eradicate the major animal epizootics and eliminate technical barriers to trade of farm animals and related commodities has led to a need to ensure that national veterinary laboratories or their delegates, that conduct testing for infectious animal diseases, can operate a quality system that is compliant with the ISO 9000 series as well as with this Standard. Therefore, as with FDIS 17025, care has been taken to incorporate the requirements of the ISO 9000 series that are relevant to the scope of testing services that are covered by the laboratory's quality system.

The acceptance between countries of test results and diagnostic interpretations will be facilitated, if laboratories comply with this Standard and obtain accreditation from bodies, which have entered into mutual recognition agreements with equivalent bodies in other countries using this Standard.

Support mechanism/programme to implement the OIE Standard in developing countries:
It is planned to organize a number of consultants meetings/workshops to prepare training material, practical aspects and "generic" guidance documents to assist the counterpart laboratory in its endeavour to implement a quality system and it is logical that the starting point of such an exercise will be focused on the technical requirements such as assay validation, QA/QC procedures, control of documentation, etc.

The first Workshop is planned to be held at the FAO/IAEA Biotechnology Laboratory in Seibersdorf, Austria, from 4 to 15 September 2000.

The main objective of the event is to prepare training material, which will facilitate the implementation of quality systems in developing countries. Two trainers from each region, Africa, Asia and Latin America, and a number of experts who will provide guidance in the development, application and adaptation of training material (CD ROM, Internet, spreadsheets, "generic" SOPs, etc.) will attend. It is planned to hold a number of follow-up consultants meetings/workshops, e.g. a second consultants meeting/workshop in 2001 will be focusing on the application and adaptation of the training material in the laboratories and an intensive discussion concerning the experiences made by the trainers when establishing a quality system in their region. During a third consultants meeting/workshop in 2002, some tangible results or outcome, e.g. established technical requirements, are expected. Once the technical requirements are established and implemented, the main concern should be given to management requirements. It may be possible that in some advanced laboratories or regions both the technical and management requirements can be tackled in parallel.

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

The 23rd EQC exercise for milk and plasma progesterone was originally scheduled for February/March 2000. However, in view of the switch-over from DPC kits to Self-coating assays which is being implemented in several counterpart laboratories, this will now be sent out together with the shipment of August 2000.

3) Résumé of EQA rounds with FAO/IAEA ELISAs

RP2000a: A round with the FAO/IAEA competitive Rinderpest ELISA is planned this year and counterparts will be informed as usual prior to the distribution of the panel.

H. COMPUTER SOFTWARE PROGRAMS

1. SID

SID 3.1 has now been supplied to most of those using a previous version of SID. It provides a computerized basis for linking field data with laboratory test results.

2. TADInfo

Under the FAO EMPRES programme, a new software program called TADInfo is being developed for use at the national, regional or global level. This program will be designed to allow those making decisions on disease control or eradication to be better informed through a systematic collection and multiple manipulation of reports on disease occurrence. It is foreseen that such reports will be geo-referenced (either at the point of collection or subsequently centrally) to allow the full use of GIS (geographical information system) in analysing these reports. A link within this approach is a software program (LABInfo) for tracking laboratory samples from their collection point to the laboratory for testing and the submission of a final test report (see below).

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

3. LABInfo

Considerable progress has been made in the development of LABInfo. As reported previously, the primary objective of LABInfo is to assist laboratories in the developing countries in organizing, documenting and analysing the laboratory data and facilitating reporting to practitioners and the national epidemiology network. Specifically, LABInfo will assist in the following:

- support workflow management in veterinary laboratories, and reduce the turn-around times in the processing of specimens submitted to the laboratory;
- enhance the capture of health/disease information from veterinary diagnostic laboratories and facilitate their inclusion in the national disease surveillance system;
- support internal and external quality audit;
- support consistent and rapid reporting.

LABInfo will be developed in the open source model, using a database and presentation software which will allow full flexibility and ease of adaptation to the specific needs of the various laboratories in the GREP countries. LABInfo will be based on an open source ‘generic’ electronic health records (EHR) system, (covering human, veterinary, pharmacological and other health related disciplines) which in turn will be built on industrial strength workflow and task management system. The open source approach will tap into the collective resources of highly skilled programmers and generate a product, which will be continually upgraded and maintained in the open source community.

The first meeting of the Open Source Community Health Alliance (OSCHA), the open-source community, which will collaborate in the development of LABInfo (and other open source health software), will be held in Rome during the first week of June 2000. The meeting will discuss, among other things, the specific platforms and the time frame for the actual development of the components of LABInfo. We expect prototypes to be ready for evaluation within a year.

I. GEOGRAPHICAL INFORMATION SYSTEMS

The GIS model to identify priority areas for tsetse control in Ethiopia has been modified and updated and is in its final stage for analysis.

Two consultancy services (CS) were organized in November and December, one in Ethiopia to collect additional field data at PA level (smallest Admin. level in Ethiopia) to support the model. Data was collected through a Workshop on GPS (Global Positioning System) data collection and data management. As a result, more than 20 persons, mainly veterinarian officers of the Didessa Valley, were trained and data sets of four districts have been collected and are now being prepared for analysis. The second CS was in Rome to discuss the progress of the model with a FAO expert and a consultant from Ethiopia.

A two-week (follow up) training on the use of GIS in the national rinderpest epidemio surveillance network at PARC-HQ, Sudan, was organized in April. As a result, a GIS set-up has been initialised at PARC-HQ and data layers to support FAO's trans-boundary animal disease database TADINFO-Sudan have been created. Training was given on digitizing, GPS data collection of surveillance sites, data management and advanced GIS applications using ArcView 3.1 and Spatial Analyst to analyse spatial data-sets, using GIS as a decision tool to assist the programme to eradicate rinderpest. The use of GIS as a planning tool for emergency response and as a monitoring and prediction tool for disease outbreaks has been discussed.

J. FUTURE RESEARCH AREAS FOR ANIMAL HEALTH IN DEVELOPING COUNTRIES USING NUCLEAR TECHNOLOGIES

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

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

Dear colleague,

The Animal Production and Health Sub-Programme of the Joint FAO/IAEA Programme on Nuclear Techniques in Food and Agriculture is in the process of developing a strategic plan for the period 2003-2010. As part of this process, we would like to obtain inputs from scientists such as you. We would be grateful for your valuable suggestions and advice on the direction, and the support that should be provided by the Sub-programme in the field of Animal Health in developing countries, and where specifically isotopes/nuclear technologies can be advantageously utilized.

We would therefore appreciate very much if you would kindly complete the attached questionnaire and return it to us by 31 May 2000.

Thanking you in anticipation.

Future Areas for Improving Animal Health in Developing Countries Using Nuclear Technologies

Introduction

The current programme strategy of the Joint FAO/IAEA Programme on Nuclear Techniques in Food and Agriculture is to promote sustainable food security by assisting developing countries to apply nuclear technologies to intensify and diversify agricultural production systems and to improve food quality and safety, while ensuring efficient and environmentally sound management of natural resources and external outputs.

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

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

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

Questionnaire

This questionnaire is intended to assist the Animal Production and Health Sub-programme of the Joint FAO/IAEA Division with formulating a strategic plan for the years 2003 - 2010. Specifically it is aimed at identifying appropriate areas for research and support through the Sub-programme in the field of animal health.

(Please keep in mind the mandate of the Animal Production and Health Sub-programme while filling in the questionnaire. The nuclear technique(s) should contribute significantly towards achieving the objectives of the identified research areas or could involve the comparison of a non-nuclear technique to an established nuclear technology).

PART A

1. What are the gaps in scientific knowledge and the research priorities which need attention in order to improve animal health in developing countries using **nuclear or nuclear-related** technologies? Please give the three most important priorities in your view. Please outline a specific area of research which is relatively specific and not too broad)

a) Research priority 1

b) Reasons for choosing this area of research

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

d) What will be the benefits to animal health diagnosticians, veterinary services and/or farmers in developing countries

e) Current status of research in this area

f) Should the technology involved be established first in our own FAO/IAEA Agricultural Laboratory, Animal Production in Austria

g) What would be the approximate costs of establishing a research capacity for this work (focus on major equipment costs)

h) What are the likely direct beneficial effects of this research in a developing country

a) improvements in animal health, livestock production or food quality ☐
b) better understanding of disease ☐
c) technology development and use ☐

i) Any institute or Organisation that is currently working in this research area that is likely to collaborate with IAEA in future work

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a) Research priority 2

b) Reasons for choosing this area of research

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

d) What will be the benefits to diagnosticians, veterinary services and/or farmers, and in how many years are they likely to reach them

e) Current status of research in this area

f) Should the technology involved be established first in our own FAO/IAEA Agricultural Laboratory, Animal Production in Austria

g) What would be the approximate cost of establishing a research capacity for this work (focus on major equipment costs)

h) What are the likely direct beneficial effects of this research in a developing country

a) improvements in animal health, livestock production or food quality ☐
b) better understanding of disease ☐
c) technology development and use ☐

i) Any institute or Organisation that is currently working in this research area that is likely to collaborate with FAO/IAEA in future work

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a) Research priority 3

b) Reasons for choosing this area of research

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

d) What will be the benefits to diagnosticians, veterinary services and/or farmers, and in how many years are they likely to reach them

e) Current status of research in this area

f) Should the technology involved be established first in our own FAO/IAEA Agricultural Laboratory, Animal Production in Austria

g) What would be the approximate costs of establishing a research capacity for this work (focus on major equipment costs)

h) What are the likely direct beneficial effects of this research

a) improvements in animal health, livestock production or food quality ☐
b) better understanding of disease ☐
c) technology development and use ☐

i) Any institute or Organisation that is currently working in this research area that is likely to collaborate with FAO/IAEA in future work

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

a) Discipline (e.g. diagnosis, vaccines, therapeutics, quality control, other areas):

Priority	Yes	No	Disciplines	Reasons/Comments
1	☐	☐		
2	☐	☐		
3	☐	☐		

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

Priority	Yes	No	Regions	Reasons/Comments
1	☐	☐		
2	☐	☐		
3	☐	☐		

c) Locations (e.g. hot humid, semi-arid, hilly, peri-urban, etc.):

Priority	Yes	No	Locations	Reasons/Comments
1	☐	☐		
2	☐	☐		
3	☐	☐		

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

Priority	Yes	No	Species	Reasons/Comments
1	☐	☐		
2	☐	☐		
3	☐	☐		

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

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

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

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

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

8 Should FAO/IAEA have closer links with the NGOs?

9. Should other issues other than animal health, play a greater role in this programme (e.g. socio-economic, extension services, privatisation)? Please explain why.

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

PART B — *Information about the respondent*

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

	YES	NO
Do you wish to have feedback on the results of this exercise?	☐	☐
Could we come back to you for further information if necessary?	☐	☐
Would you like to be placed on the mailing list for our Newsletter and technical publications?	☐	☐
Would you like to be considered for short-term consultancies or assignments? (If yes, we will send you a set of Personal History forms for completion and return)	☐	☐

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

P.S. If you need further information for completing this questionnaire, please contact Ms. Rosario León de Müllner (R.Leon-de-Muellner@iaea.org)

K. PUBLICATIONS

Published:

External Quality Assurance Programme for the FAO/IAEA/P4-22 Exercise, for the determination of progesterone in skim milk and plasma of farm livestock, Report (EQAP/May 1999) M. Khadra, O. Perera.

In Press:

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

Guidelines for the use of performance indicators in rinderpest surveillance programmes.

These documents will be published as IAEA–TECDOCs.

The external quality assurance programme for use with the FAO/IAEA indirect Brucellosis ELISA, Interim Report EQA/BRA/1999a.

In Preparation:

1. Proceedings of the Final RCM of the Co-ordinated Research Project on "Use of RIA and Related Techniques to Identify Ways of Improving Artificial Insemination Programmes for Cattle Reared under Tropical and Sub-tropical Conditions", held in Uppsala, Sweden, 10–14 May 1999.
2. Proceedings of the Second RCM of the Co-ordinated Research Project "The monitoring of contagious bovine pleuropneumonia in Africa using enzyme immunoassay" held in Lusaka, Zambia, 27 September – 1 October 1999.
3. The results of the CRP entitled "Use of immunoassay methods for improved diagnosis of trypanosomosis and monitoring tsetse and trypanosomosis control programmes" will be published before the end of 2000. The publication is a collection of 24 manuscripts dealing mainly with diagnosis and epidemiology of trypanosomosis. The publication will comprise approximately 225 pages and will be published by Backhuys Publishers, Leiden, The Netherlands.
4. The external quality assurance programme for use with the FAO/IAEA indirect Brucellosis ELISA, Interim Report EQA/BRA/1999b.

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