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 Colleagues,

Over the past few years, we have been part of an information revolution and we are now firmly entrenched in the computer age. The use of computers and electronic information technology offers many opportunities to develop, to manage and manipulate, and to disseminate information more rapidly, more extensively, and more cheaply than is ever possible with paper-based systems. This development of the electronic information era has been accompanied by the design of a whole range of electronic equipment that provides new and innovative ways of managing the information and indeed, influencing the very ways that we interact on a daily basis. The so-called digital revolution is here to stay and is continuing to rapidly evolve. As an example during the past 12 months, the number of people in the world owning a portable phone has quadrupled and in the developed world over 35% of people now own or daily utilize computers.

But this is now equally creating the so-called digital divide. The gap between what is available to those in the developed world compared to those in the developing world is rapidly growing and will continue to do so unless something is done. In some ways, this is surprising. The hardware needed is relatively cheap, requires little in the way of complex infrastructure, is robust, requires a low energy source and can comfortably link with other machines over considerable distances without cabling or similar structures. The software that manages the systems is as applicable in a developing country as it is in the developed world and lends itself to distance learning for use. Despite this, the difference in uptake and use between north and south is considerable and continuing to grow.

Fortunately, this problem is recognized by many and the United Nations is taking action. A World Summit on the Information Society (WSIS) is to be held in Geneva in 2003, and preliminary meetings are being organized to ensure that this Summit will result in concrete proposals that will ensure change and impact in the developing world. Kofi Annan, the UN Secretary General, recently in speaking on this topic described "a technological revolution that is profoundly transforming society. If harnessed and directed properly, Information and Communication Technologies (ICTs) have the potential to improve all aspects of our social, economic and cultural life".

Some three years ago, however, IAEA had already recognized this gap and through the programme of Technical Co-operation and with major support from the USA, initiated a regional Technical Co-operation project in Africa with the aim of using information communication technology (ICT) to better implement national and regional activities already supported under the programme. The Animal Production and Health Sub-programme quickly identified two areas for which ICT could significantly contribute – the training of farmers and animal health workers in the recognition of rinderpest, and the training of farmers and artificial inseminators in the effective use of artificial insemination (AI). In both these activity areas though, it was clear that the real aim was not to train local counterparts in these specific activities but to create a national capacity to utilize ICT, in these areas initially, but ultimately to use this capacity to tackle a range of disciplines for which the use of ICT would be beneficial.

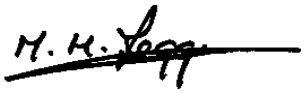
In undertaking this approach, it was first necessary to develop the training material, to identify and provide effective ICT equipment and to develop national "tele-centres" through which further training and development could take place. CD-ROMs have now been prepared containing a range of information and training material for use both for rinderpest surveillance and artificial inseminations. In parallel, tele-centres have now been established in four African countries (Sudan, Tanzania, Uganda and Ethiopia) and current activities are focusing on developing the capacity in these centers to provide national training and the preparation and dissemination of teaching material for the trainers.

The WSIS will be looking for successes and innovative ways of bridging the digital divide. I think that we have these already and I intend to ensure that the excellent programme now being undertaken in the four African countries in using ICT themselves, to address their own problems, are seen as the undoubted success that they are.

Enough now of computers, you will see in this Newsletter that we are continuing to re-direct the Sub-programme towards the use of biotechnology and gene-based technologies. In particular, I would like to draw your attention to our Symposium in 2003, and the need for you now to start making plans to participate and attend. We hope, through partnership with others, to have

available a number of sources of funds so that as many scientists as possible from developing countries can be supported to attend. You need though to apply early as resources available will never be enough and there will be a limit!

Finally, at the end of this introduction, I usually mention key staff changes but in this case there is nothing to report – the team supporting this Sub-programme remains the same and we sincerely hope that we can continue to supply you with the level of expertise and resources that you have come to expect.



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

B. FORTHCOMING EVENTS

RCA Training Workshop on the Standardized and Validated Nuclear-based Technologies, in Particular Those Based on Urinary Purine Derivatives, for Measuring Microbial Protein Supply in Ruminants (RAS/5/035)

Technical Officer: Harinder Makkar

The Training Workshop will be held from 10 to 21 June 2002 in Kuala Lumpur, Malaysia, in co-operation with the Government of Malaysia, MARDI and UPM. Fifteen participants from 13 countries will participate in the Workshop. The objective of the course is to provide training on the standardized and validated nuclear-based technologies, in particular those based on urinary purine derivatives, for measuring microbial protein supply in ruminant. The course consists of lectures on the metabolism of nucleic acids, basis for the use of urinary purine derivatives as markers for rumen microbial protein, and estimation of rumen microbial protein supply to the animal from the measurement of allantoin, uric acid, xanthine and hypoxanthine. These lectures will be blended with demonstration and practical laboratory work on the methodologies, data analysis and interpretation of results. This course will assist in increasing the capacity of participating Member States to integrate the latest techniques into research programmes.

National Training Workshop on Livestock Disease Diagnosis and Epidemiology (MON/5/011)

Technical Officer: John Crowther

This National Training Course dealing with epidemiology, diagnosis and molecular methods applied to diseases of veterinary importance will be held from 24 June to 5 July 2002. Experts from Australia and the UK will lecture and demonstrate.

Training Workshop on Management and Utilization of Field and Laboratory Data for Breeding Support Services to Livestock Farmers (RAS/5/035)

Technical Officer: Oswin Perera

The Workshop will be held from 7 to 11 July 2002 at the Bangladesh Agricultural University in Mymensingh. The course director is Prof. Mohammed Shamsuddin. Nominations received from participating RCA Member States have been evaluated and 14 participants (12 foreign and 2 local) have been selected.

National Training Workshop on Feed Supplementation Strategies and Reproduction of Camels and Yak (MON/5/011)

Technical Officer: Harinder Makkar

This Training Workshop will take place from 15 to 26 July 2002 in Mongolia.

First Research Co-ordination Meeting of the Co-ordinated Research Project on the Development of Strategies for the Effective Monitoring of Veterinary Drug Residues in Livestock and Livestock Products in Developing Countries

Technical Officer: Andrew Cannavan

This RCM was originally scheduled for June 2002, but was postponed and will now be held in Vienna from 2 to 6 September 2002. Work plans will be defined for the first phase of the project, the development and validation of methods. Specific compounds and matrices of importance to each Contract holder will be selected, and the most appropriate analytical techniques for each identified.

Workshop on Establishing Quality Systems in Veterinary Diagnostic Testing Laboratories (INT/0/060)

Technical Officer: Axel Colling

This Workshop will be held in Bogotá, Colombia, from 9 to 13 September 2002.

Prior to this Workshop, participants are requested to submit:

- individual progress reports to monitor the implementation of quality systems in each laboratory according to the work plans as established during the last meeting in South Africa in July 2001.
- an action plan (draft format) how to expand the TC project into their region (list of laboratories, national commitment, status of implementation of quality systems, and accreditation pathway, etc).

Expert visits to counterpart laboratories will be organized as external audits and audit reports will be produced. This will be a realistic exercise and give evidence where improvement is needed.

The document on Guidelines for establishing Quality Systems in Veterinary Testing Laboratories was updated in February, and the latest version is available on the web under http://www.iaea.org/programmes/nafa/d3/public/guidelines.pdf

It is planned that the document will also be translated into Spanish and French.

Regional Training Course on Foot-and-Mouth Disease (BOL/5/014)

Technical Officer: John Crowther

A 3-week Regional Training Course for South America is being planned in September/October. This Training Course will deal with the latest serological and molecular technologies for FMD diagnosis and differentiation. This Training Course will be held at LIDIVET, in Santa Cruz, Bolivia, and is open only to South American counterparts. Exact dates are to be established and information passed to the relevant agencies involved.

Train the Trainers Workshop on Improved Breeding Data Management and Integration of Progesterone-Based Farmer Services in AI Systems (RAF/5/046)

Technical Officers: Oswin Perera

The Workshop will be held at the Artificial Insemination Centre Ain Jemaa in Casablanca, Morocco, from 7 to 11 October 2002. The course director is Dr. Samira Manar. The Workshop is open to 15 participants from AFRA Member States and is aimed at training staff members of national institutes responsible for the recording, analysis and reporting of data relating to AI in the use of a customized version of the Artificial Insemination Database Application (AIDA) and related aspects of progesterone-based non-pregnancy diagnosis (N-PD) services to cattle farmers. The closing date for nominations is 15 July 2002.

Project Review Meeting to Prepare Results of Phases I and II for Publication as an Agency TECDOC, and Plan Activities for 2003–2004 (RAS/5/035)

Technical Officers: Oswin Perera and Harinder Makkar

The meeting will take place from 11 to 15 November 2002 in Hanzhou, China. All National Project Co-ordinators, who have been officially nominated by RCA Member States participating in the project RAS/5/035, will be eligible to attend. Each participant will be required to prepare and present a scientific paper based on the work undertaken and results obtained during the full period of the

project. A draft of the paper must be submitted to the IAEA by 30 September 2002. Accepted papers will be published as an Agency TECDOC. The meeting will also plan and finalize activities for a final two-year period.

Sustainable Production of Kits in Southeast Asia (RAS/5/041)

Technical Officer: John Crowther

The meeting will be held in November 2002.

Training Courses/Workshops on Strengthening Capacities for Implementing Codex Standards, Guidelines and the Recommended International Codes of Practice for Control of the Use of Veterinary Drugs

Technical Officer: Andrew Cannavan

Three sets of Training Courses will be held in 2003. Each set will consist of a course aimed at decision makers and senior public health officials, and a complementary Workshop for scientists and technical staff. The Training Courses for senior officials will focus upon issues such as good veterinary practice in the authorization and use of veterinary drugs, the design of national surveillance schemes, quality assurance and accreditation procedures. The Workshops will provide both theoretical and practical training on screening and confirmatory methodologies for veterinary drug residues, validation procedures and laboratory QA and accreditation. The first set of courses will be held in Vienna in early 2003, and will be repeated in Asia and in Africa later during the year. The dates and venues have not yet been finalized. The training material produced will also be published on paper and in CD format. Further information will be included in the next edition of the Newsletter, and details will be published on the Sub-programme website as they become available.

International Symposium on Application of Gene-Based Technologies for Improving Animal Production and Health in Developing Countries (CN-110)

Technical Officers: Martyn Jeggo and Harinder Makkar

This Symposium will be held from 6 to 10 October 2003 in Vienna, Austria.

The basic structure of the Symposium will be:

- Plenary lectures
- Theme-specific sessions
- Panel discussion/discussion forum

Detailed information on the Symposium is available at the Website.
http://www.iaea.org/programmes/nafa/d3/index-symp2003.html

Some important dates:

September 2002: Announcement letter inviting extended synopsis and grant applications;
End of January 2003: Receipt of extended synopsis and grant applications.

No registration fee will be charged to participants.

Suggestions and comments on the Symposium should be sent to: H.Makkar@ iaea.org

C. PAST EVENTS

Regional Training Workshop Update on Technologies for the Surveillance of Rinderpest Freedom Supported under OAU/IBAR/PACE Programme RAF/5/053

Technical Officers: Mamadou Lelenta and Martyn Jeggo

The workshop was hosted by the "Institut Sénégalais de Recherches Agricoles (ISRA)", "Lab. National d'Elevage et Recherches Vétérinaires (LNERV)", Dakar, Senegal, and was held from 19 to 23 November 2001 at the conference room of ISRA and from 26 to 30 November 2001 at the Virology department/laboratory of the LNERV. It was attended by 34 scientists from veterinary diagnostic laboratories: Benin (1), Burkina Faso (1), Cameroon (2), Côte d'Ivoire (1), Egypt (2), Gambia (1), Ghana (1), Guinea Bissau (1), Guinea Conakry (1), Kenya (2), Mali (1), Mauritania (1), Niger (2), Nigeria (2), Uganda (2), Senegal (7), Somalia (1), Sudan (2), Tanzania (1), Chad (1), and Togo (1).

The Workshop was assisted by IAEA experts from the International Laboratory of Molecular Biology University of Davis California (USA) (Prof. Yilma, and Dr. Shabbir) and the CIRAD/EMVT, Montpellier, France (Dr. Libeau), the IAEA regional expert at OAU/IBAR/PACE in Nairobi (Dr. Tounkara), lecturers from OAU/IBAR/PACE in Nairobi (Drs. Bessin, Bidjeh and Kock) and Bamako (Drs. Diop. Chardonnet, Maillard), from the OIE Regional Office for Africa in Bamako (Dr. Sidibe) and from IAEA (Dr. Diallo, Head Animal Production Unit, Seib.) and Mr. M. Lelenta.

The Workshop was organized as presentations, lectures, discussions and laboratory practical. Initially, the Technical Officer presented the background to the project and the objectives of the Workshop.

Following the formal presentations (on day two), the meeting concluded that at present there is no single rinderpest assay that is suitable to meet the needs for rinderpest sero-surveillance, a prerequisite activity for countries wishing to be internationally recognized as free of this disease. A combination of assays is therefore required.

A working group of eleven persons was formed, chaired by Dr. Majiyagbe (Nigeria), to draft recommendations for the current selection and use of diagnostic tests for rinderpest and PPR for cattle, small ruminants and wildlife with respect to national sero-surveillance. These recommendations have been included into the overall Workshop recommendations. It was stressed that there is a necessity to improve the available rinderpest diagnostic tests and to continue to develop new and better (more sensitive and specific) assays.

The second week focused on presentation and training on the rinderpest ELISA kit from ILMB (International Laboratory for Molecular Biology, USA). This kit will be field validated in 10 voluntary countries along with the H-cELISA (Pirbright), the NRGK-based cELISA and the PPR N-cELISA (Cirad-EMVT). It is expected to complete this field validation by the end of June 2002.

A full report on the Workshop containing overall Workshop conclusions and recommendations is available in the Africa Section and the Animal Production and Heath Section.

Second Research Co-ordination Meeting of the Co-ordinated Research Project on the Use of Non-structural Protein of Foot-and-Mouth Disease Virus to Differentiate Between Vaccinated and Infected Animals (D3.20.20)

Technical Officer: John Crowther

This RCM was held from 4 to 8 March in Geelong, Australia.

The meeting brought together Research Contract holders, Agreement holders and the representatives of the commercial firms with non-structural (NS) ELISA kits already on the market. Presentations were made by the commercial companies dealing with their assays (all Indirect ELISA systems). These were: United Biomedical Inc. (USA);

Bommeli Diagnostics (Switzerland, associated with INTERVET-Netherlands) and EMBRABIO. (South America associated with PANAFTOSA). A presentation was also made by INTERVET who stressed the importance of examining the vaccine quality when using NS tests since contamination with NS proteins can give rise to antibodies associated not with infection, but with vaccine proteins. Results using the previously available reagents from the UK, Italy, Denmark and UBI, were presented by the Contract holders. These illustrated that there were many serum samples collected from various species representing different disease situations. These samples were characterized with respect to both epidemiological considerations (infected or post-vaccinated) and through other tests (liquid phase blocking assays, VNT and VIAA) to allow them to be used in future exercises. Differences in the performance of the assays were discussed. In general, the assays were similar in sensitivity and specificity and it was agreed that there should be no definitive conclusions from this study since the situation with regard to the exact nature of the kits and the affiliations of Institutions with commercial companies had changed considerably since the start of the CRP. A successful competitive assay using 3ABC baculo expressed protein and a monoclonal antibody from Brescia was described. A competitive assay was described being developed through Technical Contracts in Geelong and Vienna involving 3ABC baculo expressed protein and chicken antibodies. It was expected that this would be sufficiently validated to be compared to other tests by the end of 2002. Reference sera and setting up a serum bank in the FAO/IAEA Laboratory, Seibersdorf, were discussed and plans worked out to facilitate this.

Recommendations and Conclusions

It was concluded that tests to differentiate vaccinated from infected animals were crucial and that acceleration in producing validation data on a wider front was essential.

It was agreed that the focus should be on kits from commercial sources. A rapid exercise was planned to allow harmonization of the performance of such kits. Data will be all sent to the TO first, then examined by all Agreement holders and Commercial companies, before a publication on the data is submitted to the OIE.

- It was stressed that there should be improvement in the internal quality control standards for use in examining tests continuously, and also more help should be included in kits to describe their use in different epidemiological situations with regard to accepted cut-off values, which define the diagnostic sensitivity and specificity of the assays.
- It was agreed that the induction of anti-NS antibodies following vaccination should be examined wherever possible, particularly where “local”, less well-purified vaccines were used.
- It was agreed that there was a need to identify both standard sera for measurement of defined activity as well as panels for the validation of tests. Dr. Dekker (Lelystad) offered a post-infection bovine serum of high titre as a reference standard. This will be made available to the CRP and be irradiated and diluted in Australian derived serum. This will be held at the FAO/IAEA Laboratory, Seibersdorf, in a serum bank and may be suitable as a gold standard for cattle anti-post infection NS activity. The setting up of a bank at Seibersdorf would be fully transparent and links with the World Reference Laboratory and other reference laboratories. Each Research Contract holder was given the responsibility to look for sera from all species, in large volumes, to add to the serum bank.
- It was agreed that the presence of the commercial companies was vital to establish, as quickly as possible, assay criteria acceptable to counterparts, International bodies and to allow agreement on the harmonization of the tests along OIE guidelines.
- The results from the first two years will be published in an extensive report.

The organizers in Geelong should be congratulated for their excellent arrangements and hospitality.

Project Review, Co-ordination and Planning Meeting of the AFRA III-2 Project on Improving and Increasing Milk and Meat Production (RAF/5/046)

Technical Officer: Oswin Perera

This meeting took place from 4 to 8 March 2002 in Addis Ababa, Ethiopia.

The meeting was hosted by the National Artificial Insemination Centre of Ethiopia and was held at the Ministry of Agriculture in Addis Ababa. It was attended by 11 Project Co-ordinatorss from the following AFRA Member States (MSs): Algeria, Burkina Faso, Ethiopia, Kenya, Senegal, South Africa, Sudan, Tanzania, Tunisia, Uganda and Zambia. Morocco was the only MS that did not attend. It was assisted by an IAEA expert (Dr. Peter Ball, UK), the IAEA Technical Officer (Dr. Oswin Perera), and the Project Officer (Mr. Prajesh Bhakta).

Presentations were made by the resource persons (Bhakta, Perera and Ball), followed by country presentations by all PCs describing the progress and results obtained so far, the country work plans and arrangements for future project activities. This was followed by a SWOT analysis and a discussion on future work plans, both on an individual and regional basis, and identification of needs for inputs. Discussions were held on the AIDA computer program and supply of RIA reagents.

Individual and regional work plans were drafted by the PCs with the assistance of the resource persons and inputs required from MSs and IAEA were identified. Conclusions and recommendations were drafted and the regional work plan was modified accordingly.

A field visit was made to three medium and large dairy cattle farms in the region around Kaliti, the National Artificial Insemination Centre at Kaliti, and the Field Station of the International Livestock Research Institute (ILRI) at Debre Zeit.

The full meeting report containing the proceedings, SWOT analysis, conclusions, recommendations, agenda, list of participants and updated project work plan is available from the Animal Production and Health Section and the office of the AFRA Projects Co-ordinator.

We are grateful to Dr. Mulugeta Amha, Dr. Emiru Zewdie and Dr. Tsegaye Shiferaw for assistance in organizing this meeting.

First Research Co-ordination Meeting of the Co-ordinated Research Project on Integrated Approach for Improving Small-scale Market-oriented Dairy Systems (D3.10.23)

Technical Officer: Oswin Perera

This CRP was initiated in October 2001, with the award of ten Research Contracts, four Research Agreements and one Technical Contract. The first RCM was held at IAEA, Vienna, from 8 to 12 April 2002. It was attended by all 15 awardees.

The objectives of the meeting were to: (a) present, discuss and finalize the detailed work plans of each participant, including the protocols for field and laboratory studies; (b) provide guidelines and instructions on procedures for conducting a participatory rural appraisal (PRA) and on the use of a computer spreadsheet for an economic opportunity survey (EOS); (c) discuss future plans for a diagnostic and surveillance study (DSS); and (d) demonstrate a test version of the computer database Livestock Information Management Application (LIMA).

The Research Contract holders presented information on the background to their project and the future work plans. The Research Agreement and Technical Contract holders made presentations based on their specific expertise of relevance to the project and provided Research Contract holders with information and guidelines for activities planned during the first two years of the project. This was followed by further presentations and discussions to provide instructions on the PRA and EOS, and a computer Workshop during which demonstrations were done on the EOS worksheet developed under Microsoft Excel and a beta version of the LIMA database developed under Microsoft Access. The hands-on practice by Research Contract holders,

which had been planned, had to be curtailed due to the limitations posed by the restricted version of Microsoft Windows 2000 installed on the computers in the Agency's training room.

Each Research Contract holder worked with Research Agreement and Technical Contract holders to further develop and refine their individual work plans, including the protocols for the two field surveys (PRA and EOS). In order to foster close interaction and continued assistance on technical and scientific matters in the future, each Research Agreement and Technical Contract holder was assigned two Research Contract holders.

The project work plan and schedule of activities as envisaged in the project document were reviewed and updated in accordance with individual work plans and related practical considerations. Finally, conclusions and recommendations were drafted, presented and adopted.

Conclusions

- The participants endorsed the objectives of the CRP and agreed that the activities and expected outputs described in the project document were satisfactory. The schedule of activities was fine tuned for the needs of individual countries.
- The RCM reviewed the preparatory activities conducted by each participant as outlined in the proposal and confirmed that suitable Contract and Agreement holders have been selected.
- The RCM was able to achieve the development of work plans in accordance with each country's requirements and the minimum resources and research capacity available. However, some teams still need to incorporate specialists in socio-economics.

The inter-regional composition of the RCM enabled participants to appreciate the diversity and importance of dairy farming systems in the different parts of the world, and to establish contacts that will be valuable for the future CRP activities.

Recommendations

- The CRP must be conducted for a full five-year period to achieve its objectives.
- All teams need to identify research projects which will address specific issues of importance to the CRP for potential funding by other donors.
- The first phase (PRA, EOS and DSS) should be completed by December 2003.
- The Research Contract and Agreement holders should maintain regular contact with the IAEA Project Officer and with each other during the implementation of the project.
- The second RCM should be held in the last week of July 2003. Paraguay and USA are alternative sites. By this time, the PRA and initial EOS will have been completed and the DSS initiated. The use of LIMA and partial budget analyses will be included in the RCM.
- The second phase (interventions) must commence by January 2004.
- The third RCM will be held in 2005.
- The final RCM will be held in 2006. The final results of the CRP will be presented and prepared for publication at this RCM.

RCA Workshop of National Consultants on Evaluation of Breeding Bulls and Semen Quality Control (RAS/5/035)

Technical Officer: Oswin Perera

The Workshop was hosted by the University of Agriculture, Faisalabad (UAF) and the Nuclear Institute for Agriculture and Biology (NIAB), Faisalabad. It was held from 20 to 26 April 2002 at the UAF and was attended by National Consultants (NCs) nominated from 10 RCA Member States (MSs) participating in the project (Bangladesh, China, India, Indonesia, Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka and Thailand), as well as several local participants from the host institutes. It was assisted by an IAEA expert (Dr. Nico Schutte of South Africa) and the IAEA Technical Officer (TO).

The opening ceremony was addressed by the Project Co-ordinator for Pakistan, the Dean of the Faculty of Veterinary Science, the Director of NIAB, the IAEA TO and the Vice Chancellor of UAF as the Chief Guest.

The Workshop was organized in the form of plenary sessions, group work, field and laboratory visits and round-table discussions. Plenary sessions commenced with a presentation by Dr. Perera on an overview of the project RAS/5/035 and the specific objectives, activities and expected outputs for the meeting. This was followed by review presentations from Dr. Schutte and Prof. Munzoor Ahmad Qureshi on the current status of AI activities in South Africa and Pakistan, respectively.

Each NC then made a presentation on a previously assigned topic, dealing with an in-depth review on the current methodologies being used in her/his country, a comparison with those recommended for AFRA countries, a comparative analysis of strengths and weaknesses, and suggestions for improvement. The presentations were followed by discussions to review the AFRA manual further and identify specific areas where modifications, additions and deletions were necessary to adapt the technical content to the needs of Asian countries. The participants then worked in three groups, with each group undertaking the drafting of an assigned section of the manual directly on a computer word processor. This was followed by plenary sessions to present and review the drafts, to identify further improvements necessary and to make conclusions and recommendations.

A field visit was made to the main Semen Production Unit of Punjab Province at Qadirabad, and to the Livestock Production Research Institute at Bahadurnagar, Okara. Visits were also made to several Departments in the Faculty of Veterinary Science and to the laboratories dealing with animal production and health at NIAB. The Workshop was closed by the Director of NIAB.

Conclusions and recommendations

- The presentations made at the meeting provided a comprehensive overview of the current practices being adopted for selection and management of AI bulls, use of semen technology and AI services in the participating RCA MSs.
- It provided an opportunity for participants to discuss in detail the technical as well as procedural issues, to exchange experiences and to learn from one another. They appreciated the opportunity to discuss strategies being adopted by different countries to improve the AI services for cattle and buffaloes, and to identify the limitations and constraints.
- The major problems identified were: lack of a sound system for evaluation of breeding bulls; improper semen handling; inadequate and expensive supply of liquid nitrogen; poor heat detection, incorrect timing of AI and poor hygiene; inadequate AI recording, follow-up and reporting; lack of clear breeding policies for cross-breeding; inadequate logistic support to field services; and lack of incentive schemes and accountability.
- It was clear that no universal remedy for the identified problems was possible, but there were common technical and procedural aspects that can be improved and standardized for application in the Asian region. The meeting, therefore, considered and reached consensus on the most appropriate techniques and procedures for obtaining optimum results under the prevailing conditions in Asia.
- The manual of guidelines that had been developed under the IAEA TC project RAF/5/046 for African countries was reviewed, and it was concluded that the manual served as a good framework to undertake modifications necessary for needs of Asian countries.
- The main modifications needed include the following: addition of a table containing the major breeds of cattle and buffaloes used for milk, meat and work in each participating MS; inclusion of information and guidelines relevant to buffalo breeding and AI; pointing out the hazards of indiscriminate cross-breeding; inclusion of a section on preparation and sterilization of equipment; inclusion of examples of typical extenders for chilled and frozen semen; outlining the role of Governments and organizations or committees of stakeholders to promote and support expansion of AI; suggesting the provision of incentives based on performance to AI technicians to improve AI services, and a system of better accountability; and deletion of text and Annexes that are not relevant to Asian conditions.
- Since some sections of the AFRA manual will be used with little change in the Asian

manual, the contributors to the former should be fully acknowledged.

- The first draft of the manual was done during the meeting. The TO and the expert should undertake technical and editorial improvements and send the second draft to the participants and the Project Co-ordinators (PCs) of the reproduction component of RAS/5/035 by end of June 2002.
- The participants and PCs should discuss the contents with colleagues in the AI services of their countries and return comments and suggestions for further improvement to TO and the expert by end of July 2002.
- The third draft should be completed by end of September 2002, and distributed to all PCs. The Review Meeting of PCs, planned for November 2002 in China, should discuss the contents and recommend any further improvements necessary for final adoption as an RCA advisory document.
- The PCs should send a list of persons in their countries to whom the document should be sent. The suggested distribution includes: Ministries of Agriculture/Livestock, Directorates of Livestock and Veterinary Services, AI Centres, Semen Distribution Centres, local authorities responsible for livestock development services, Faculties of Veterinary and Animal Sciences, and Institutions for breeding research and training of AI technicians.
- IAEA should consider future support to programmes aimed at creating awareness of AI service providers and dairy farmers on the improved practices recommended in the manual, through pilot schemes and training activities.

We are grateful to Dr. Laeeq Lodhi for assistance in organizing this meeting.

Regional Co-ordination Meeting under the Regional IAEA Technical Co-operation Project RAF/5/053 and within the Auspices of the OAU/IBAR PARC Programme

Technical Officers: Mamadou Lelenta and Martyn Jeggo

The meeting was hosted by the National Council for Science and Technology and OAU/IBAR PACE Programme and was held from 22 to 26 April 2002 at the Nairobi Safari Club in Nairobi. It was attended by 13 Project Co-ordinators (PCs) from Burkina Faso, Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Mali, Niger, Nigeria, Senegal, Sudan, Uganda and the United Republic of Tanzania. Of the Member States participating in the project, only Egypt did not attend. An IAEA expert (Prof. Yilma from the University of California, Davis), a representative from FAO (Dr. Peter Roeder) as well as staff from OAU/IBAR PACE attended the meeting.

The Project Officer (Mr. P. Bhakta) and the Technical Officer (Mr. M. Lelenta) participated at the meeting and assisted in reviewing project achievements and weaknesses and in identifying future needs for the TC cycle 2003-2004. They also reviewed the progress made in the implementation of follow-up actions from the previous Workshops and meetings and discussed activities of the OAU/IBAR PACE programme.

Presentations were made by the Project Officer and OAU/IBAR PACE, followed by country presentations by all PCs describing the progress and results obtained so far, the country work plans and arrangements for future project activities. As follow-up of the Regional Workshop in Dakar, some initial results obtained from the validation exercise of the rinderpest iELISA were presented and discussed as well as agreement reached on the next steps to complete the validation exercise.

Working groups held discussions on three major issues affecting the project: links with national PACE projects, future technical direction of the project and diagnosis and surveillance of rinderpest and other diseases.

The meeting report, containing detailed information on the proceedings, agenda, list of participants is available in the offices of the AFRA Projects Co-ordinator and NAAL.

Fourth Research Co-ordination Meeting of the Co-ordinated Research Project on the Use of Nuclear and Colorimetric Techniques for Measuring Microbial Protein Supply from Local Feed Resources in Ruminant Animals (D3.10.22)

Technical Officer: Harinder Makkar

This meeting was held from 6 to 10 May 2002 in Hue, Vietnam. Eight Research Contract holders, six Agreement holders, four observers and the Technical Officer attended the meeting. The purpose of the meeting was to review the work conducted and to formulate conclusions and recommendations, which are given below. A summary of the significant achievements will be available in the next Newsletter. This will also be posted at our website in July 2002. This project has concluded with this meeting.

Conclusions

1. All participating groups have achieved good progress and completed all the work planned during the third RCM in Malaysia in 2000.

2. The TECDOC developed for use in this CRP has proved to be a successful way of helping participants to collect, process and analyze biological samples. Standardized methods and procedures, outlined in the laboratory manual (TECDOC-945) have enabled the participants to carry out their experiments confidently and produce results that are scientifically valid.

3. The purine derivative (PD) excretion method has the advantage of being non-invasive, simple to use, and inexpensive. The method gives a good prediction of microbial out-flow from the rumen.

4. Digestible organic matter intake (DOMI) and PD: Creatine ratios corrected for metabolic weight (PDC index) are similar for different species of cattle, and the data therefore can be combined to give a single prediction equation of DOMI from PDC index. This is a novel approach for estimation of DOMI, especially for grazing animals since the determination of DOMI is difficult and reliable for grazing animals.

5. Buffaloes have much lower (and more variable) excretion of PD per unit DOMI than cattle that is neither related to lower supply of microbial cells from the rumen, nor to absorption of purines from the small intestine. This difference between buffalo and cattle could be due to differences in tissue metabolism for which mechanisms are not fully understood.

6. This project also reported unique data for camels showing increases in PD excretion that are closely related to DOMI, suggesting that PD excretion can be used for prediction of rumen microbial outflow in this species. Xanthine oxidase activity was not detected in blood plasma from camels and the enzyme activity in all tissues examined was lower than in other ruminants. Creatinine excretion was about one-third of that in other large ruminants examined in this project. The recovery of purine bases infused into the duodenum was significantly lower than that from other ruminants.

7. The PDC index developed in this project, in general responded positively as expected to changes in DOMI, and the creatinine excretion was proved to be a robust means of predicting quantitative recovery of PD. The index has potential as a research tool to optimize feed resources, and as a diagnostic tool to categorize the animals into 'bands' corresponding to their nutritional status.

8. A method for determination of urinary purine derivatives based on Near Infra Red Spectroscopy (NIRS) developed under this project seems to have potential for field applications.

Recommendations

1. The papers should be published as an IAEA-TECDOC.

2. The tools developed in this project could effectively be used in the IAEA TC projects for promoting animal production in developing countries.

3. The work to develop more rapid tests for PD for diagnostic use, particularly in field, e.g. dipstick (paper-litmus type) tests, biosensor, easy-to-use kits, etc. should be undertaken.

4. Further research to elucidate mechanisms that cause buffaloes and camels to be different from cattle, sheep and goats with respect to PD excretion should be supported. Work is also

needed to exploit full potential of NIRS for measuring PD excretion.

5. The PDC index and the use of 'spot urine test' have been found to be a powerful tool for both research and diagnostic purposes. Training Workshops should be organized to assist competence in use of the PD and related techniques.

6. Success of this CRP was enhanced by attention to quality control approaches throughout this project, and adoption of a similar approach of integrating quality control approaches with other activities is recommended for all future research programmes.

7. The results of the project should be collated and presented at an appropriate International Conference as achievements of the Joint FAO/IAEA Purine CRP.

Third Research Co-ordination Meeting of the Co-ordinated Research Project on the Effectiveness of Vaccination Strategies Against Newcastle Disease and Gumboro Disease Using Immunoassay-based Technologies for Increasing Farmyard Poultry Production (D3.20.19)

Technical Officer: Martyn Jeggo

The third RCM of this CRP took place in Quatre Bornes, Mauritius, from 6 to 10 May 2002. Twelve Research Contract holders, four Agreement holders, three observers and the Technical Officer attended the meeting.

The meeting produced a detailed set of recommendations for studies to be undertaken during the final 18 months of this CRP. The following summarize these.

1. Improving village poultry production is highly feasible and can have a significant impact on poverty alleviation and food security in impoverished rural communities. Given that in most cases poultry are managed by the women in villages, this also has a significant potential to raise their profile.
2. Whilst Newcastle disease is the single biggest killer, vaccination is highly effective in preventing this disease at the village level. Good, thermostabile and locally produced vaccines are available. It is not necessary to further demonstrate this simple fact in research studies under this CRP, although linking decrease in mortality to production data is essential.
3. Supplementary feeding as an adjunct to scavenging is highly cost-effective but should be based on locally available feed resources. Where possible, these should be balanced and augment what is available from the Scavenging Feed Resource Base (SFRB). A guidelines document on how to undertake this should be prepared as part of this CRP.
4. Losses through predation are significant, and particularly with chicks, can be easily prevented through the provision of low-cost locally produced chicken houses. FAO/DANIDA will publish a guidelines document on how to design such housing within three months.
5. It is essential that the data collected under these studies be as accurate as possible in order to provide substance to the reports and to enable subsequent widespread publication. This will require weekly visits at a minimum to village study sites.
6. Final reports must include a partial budget analysis in order to link the interventions to productivity gain. This will be highly important in ensuring widespread uptake of these interventions.
7. Given the potential impact on the well-being of rural communities in Africa that the approaches being developed under this CRP could have, it is recommended that every effort be made to develop and gain support for a follow-on extension programme to establish the widespread adoption of these simple interventions strategies.

Training Course on PCR

Technical Officer: John Crowther

The course on PCR indicated in the last Newsletter, was held at Onderstepoort, South Africa (6–31 May 2002) and run by Dr. G. Viljoen. This was partly supported by the Joint FAO/IAEA Division. It is intended to organize this course each year. Those interested in the course should contact Dr. G. Viljoen (Gerrit@moon.ovi.ac.za) as well as Dr. J. Crowther (J.Crowther@iaea.org) in Vienna as soon as possible. If submissions are made in time, we can organize support much earlier, than this year and not disappoint people. For this year, the applications for TC fellowship training to support the attendance of the course was affected by late delivery of application forms and a lack of funds available by TC for training, particularly for African countries. A report on the PCR course will be given in the next Newsletter.

National Training Workshop on Livestock Disease Control (YEM/5/004)

Technical Officer: John Crowther

This Workshop was held from 11 to 22 May 2002 at the Directorate of Animal Health, Sanaa,Yemen. It was run with Yemen staff and by Dr. H. Unger, Vienna Veterinary University, Dr. R. Geiger, and the Technical Officer.

The major transboundary diseases are still one of the most important constraints to the development of the livestock sector in Yemen. The last case of rinderpest was reported in 1995, and consequently in 1999 vaccinations against rinderpest were stopped. All rinderpest vaccines were drawn together at the Directorate of Animal Health and Yemen embarked on the OIE pathway. The emergence of RVF in Yemen in September 2000, leading to 145 human deaths and 20,000 abortions, was the first time the disease was reported outside Africa. The disease was successfully contained. Now it is essential to establish a country-wide disease surveillance system and a rapid response/emergency preparedness system to react rapidly to newly occurring outbreaks or re-emerging foci of the disease. Crucial to a disease surveillance/reporting system is the capacity to confirm the disease at the laboratory level, and that the laboratory services and the veterinary field services are fully integrated.

The presence of many other epizootics in Yemen was confirmed (PPR, FMD, RVF, brucellosis) or is suspected (CCPP) but the prevalence and the distribution of these diseases is unknown and there is a strong need to establish a country-wide disease surveillance system for the major transboundary diseases. The establishment of a rinderpest surveillance and reporting system should now form the backbone for the surveillance of other epizootic diseases.

At the laboratory level, a comprehensive ELISA-based diagnostic capacity for the diagnosis of rinderpest and PPR is already well established and the diagnostic techniques for the other epizootics, including PCR, will be introduced shortly. In combination with an active clinical surveillance and sample submission system, this will form the core of the national disease surveillance system to develop control and surveillance strategies for RP, PPR, FMD, RVF and brucellosis.

The Workshop was held in two parts. The first part introduced the participants to the epidemiology, the diagnosis and differential diagnosis, and the concepts for the control of the major transboundary diseases. The Workshop assisted with the kick-off of a national disease surveillance system, which integrated the laboratory and the veterinary field services.

Background on disease reporting systems, sample submission systems and the operation and control of such systems, based on performance indicators, was covered during the Workshop. Emphasis was put on basic epidemiological investigation techniques at the field level using rapid appraisal systems and interview techniques.

The second part of the Workshop covered the laboratory aspects of the diagnosis of transboundary diseases, testing strategies and interpretation of the laboratory results.

The Workshop consisted of a series of formal presentations, followed by discussions on the

needs for the development of a national system for disease surveillance and to agree on the operation of such a system. Practical sessions in sample taking, preparation and submission to the laboratory for confirmation were included. Epidemiological investigation techniques and rapid appraisal systems were introduced and practiced during several field visits.

AFRA Task Force Meeting to Update and Customize the AIDA Database for Integration with Existing Data Recording and Management Systems, for Use by National AI Services (AFRA III-2, RAF/5/046)

Technical Officer: Oswin Perera

This meeting was hosted by the Kenya Agricultural Research Institute (KARI) and was held from 13-17 May 2002 at the Utafiti Hall of the Crop Management Research and Training (CMRT) Project on the campus of Egerton University at Njoro, Nakuru. The objectives were to:

- Review the results and experiences obtained in the use of AIDA (Artificial Insemination Database Application) by participants.
- Consider the current systems of recording, analysing and reporting AI data in national AI programmes of five selected AFRA Member States (MSs).
- Review the structure and content of AIDA Asia which were developed under the RCA project RAS/5/035, and determine features that are applicable to African conditions.
- Define a suitable "Minimum Data Set" (MDS) and individual cow record sheet to be adopted for AI recording in the field.
- Identify and document the modifications necessary for customizing AIDA for routine use in AFRA Member States.

The meeting was attended by four of the five invited Project Co-ordinators (PCs) from AFRA MSs (Tanzania, Tunisia, Uganda and Zambia) and the PC for Kenya who was the local organizer. There were over ten local participants, representing the National Beef Research Centre of KARI at Lanet in Nakuru, the Central Artificial Insemination Station (CAIS) in Kabete, Provincial and District Livestock Services in Nakuru, and Egerton University. The meeting was supported by an IAEA expert (Dr. Mario Garcia, Peru) and the IAEA Technical Officer (Dr. Oswin Perera).

The Opening Ceremony was addressed by the PC for Kenya (Dr. Douglas Indetie), the IAEA Technical Officer, the Secretary, National Council for Science and Technology (Prof. King'oria) and the Deputy Director of Kenya Agricultural Research Institute (Dr. Ephrahim Mukisira) representing the Director as Chief Guest.

The meeting was organized in the form of plenary sessions, group work, field visits and round-table discussions. Plenary sessions included presentations by Dr. Perera, Dr. Garcia and each PC. This was followed by a general discussion to summarize strengths and weaknesses of current methods, identify needs for improvement and determine characteristics of an optimum system. Factors such as routes of data flow from periphery to center, analysis and reporting back to field units and farmers, and need for compatibility with other systems were considered.

Field visits were arranged to observe the operation of different components of the current data management system in Kenya. This included medium and large dairy farms (Pokea and De La Mere farms) and the CAIS at Kabete. Visits were also made to the headquarters of KARI in Nairobi and the National Beef Research Centre at Lanet in Nakuru.

Subsequent group activities and round-table discussions were focused on defining the "core" and "optional" fields to be included in the database, specification of variables to be recorded, and listing the reports required at each level of AI organization. Finally, conclusions and recommendations were formulated, discussed and adopted. The meeting was closed by the Director of Animal Production, Ministry of Agriculture and Rural Development (Mr. S. Chabeda).

Conclusions

- Improvement of the recording, reporting and use of AI data in AFRA MSs is an urgent need.

- AIDA Asia contains much of the basic requirements for use in AFRA MSs and can be suitably modified for the purpose.
- The modifications and improvements agreed on during this meeting should be used in developing a new application named "AIDA Africa".

Recommendations

To Governments

- Governments and other institutions responsible for AI services should support their development and improvement in AFRA MSs. This would include the adoption of a reliable field recording system, conduct of follow-up pregnancy diagnosis (PD) in order to assess results, and the compilation and reporting of data.
- Governments should support the application and use of AIDA Africa in order to improve the recording, compilation and reporting AI data.
- The hardware necessary for data management should be provided, together with the required in-country training for personnel.
- Greater emphasis needs to be placed on extension services for providing farmers with the information required to motivate them to keep adequate records.
- Sustainability of AI services and improved data management should be ensured through appropriate policies, creation of infrastructure and promoting awareness.
- AI services and AI Centres should aim to be self-sustaining.

To the Agency

- Support should be provided to complete the programming necessary to develop AIDA Africa in accordance with the schedule below, through a contract to the expert who developed AIDA Asia.
- A test version of AIDA Africa should be ready by end of August 2002 and distributed to all PCs.
- The test version should be used for the training workshop planned for October 2002 in Morocco.
- The final version of AIDA Africa should be compiled based on the feedback from PCs and the experience gained during the training workshop, and distributed to PCs by end of January 2003.
- The wider application of AIDA Africa in AFRA MSs should be promoted through further assistance during the years 2003 and 2004, until a new project proposal is formulated for the subsequent programme cycle (2005-2006).
- Support should be provided for further training on data management and evaluation using AIDA Africa, and for its incorporation with progesterone RIA for farmer services.
- The AFRA Field Management Committee should emphasize the need for AFRA National Co-ordinators to support these activities.

To the Project Co-ordinators

- The PCs should ensure that their nominees attending the training workshop in October 2002 in Morocco bring with them the data file from AIDA Africa with a minimum of 100 AI records entered.
- They should ensure that a minimum of 500 AI records is entered and the data file returned to IAEA and the expert by end of November 2002.
- Feed-back provided on the test version should include comments on the usefulness and application of AIDA Africa, together with specific recommendations for modifications or improvements.
- PCs should further strengthen linkages with AI services at all levels and actively collaborate in promoting the wider application of AIDA Africa.
- PCs should emphasize the need to conduct follow-up manual PD at 60-90 days after AI in at least a proportion of the inseminated animals.

We are grateful to Dr. Douglas Indetie and staff of KARI for assistance in organizing this meeting.

Workshop on SADC Veterinary Laboratory Capacities and Accreditation Procedures (RAF/5/053)

Technical Officer: Martyn Jeggo

This Workshop took place from 27 to 31 May in Pretoria, South Africa, and brought together heads of national veterinary laboratories from SADC to discuss current capacities for the diagnosis of the major diseases affecting livestock trade in the region and to further consider progress in each laboratory towards international veterinary laboratory accreditation.

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 has concluded. It aimed at developing a simple method, which can readily be used by extension workers or farmer advisors 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. A detailed report will be available in the next Newsletter. The final RCM was held from 6 to 10 May 2002 in Vietnam.

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 was initiated in 1999. The Second Research Co-ordination Meeting (RCM) was held from 19 to 23 November 2001 to review the results obtained so far on development, refinement, standardisation and validation of tannin assays to seek correlation with animal performance indicators; and to plan future studies. The meeting was hosted by the Centro de Energia Nuclear na Agricultura (CENA), Universidade de Sao Paulo, Piracicaba, Brazil. It was attended by 10 Research Contract and Agreement holders, the Scientific Secretary of the Project, and 10-15 staff members and students of the host institution.

Conclusions

- All participating groups have achieved good progress and completed approximately 95% of the work plans formulated during the first RCM. Lack of time prevented completion of analysis of urinary purine derivatives which will be completed during the second phase. All Research Contract holders were able to establish a set of eight different tannin assays, including the ^{125}I-labelled BSA method for characterization of tree leaves and browses for tannin levels and activity.
- All Research Contract holders used the same protocols and standards for tannin assays which enabled comparison of the results and provided meaningful information. The training on tannins assays given by one of the Technical Contract holders provided essential skills to the Contract holders to allow successful completion of the first phase of the CRP. The Joint FAO/IAEA Working Manual on Tannin Assays compiled by the Technical Officer was found highly useful.
- A total of 48 species of tree leaves and browses were characterized for tannin levels and activity. Ten of them were also evaluated in *in vivo* studies. The apparent digestibility coefficients of N correlated best with the following tannin assays: total phenol, total tannins, condensed tannins, radiolabelled BSA method, and percentage increase in gas on inactivation of tannins using polyethylene glycol (PEG) in the *in vitro* method for measuring gas production. When these tannin values were adjusted according to the N level in the forages (tannin %/N%), correlations remained high but were not improved. None of these values was a good predictor of feed intake in the short term *in vivo* studies. Under the conditions of these short-term studies, using a seven-day adaptation period, the intake data should be interpreted with caution. The intake data gave variable relative values but there were indications that tanniniferous forages need a longer adaptation period.
- Total phenols and tannins correlated best with the percentage increase in gas production on inactivation of tannins by polyethylene glycol (PEG) in the *in vitro* gas production method, suggesting that these assays, which are the simplest amongst the group of assays used in the first phase, provide useful information on the biological activity of tannins in the rumen and also in the whole gastrointestinal tract. In one study using leaves from 37 tree and browse species, it was concluded that samples containing total phenols and tannins levels (measured according to the Joint FAO/IAEA Working Manual on Tannin Assays) up to 4 and 2% respectively, are not expected to precipitate protein nor cause increases in gas

production on the addition of PEG in the *in vitro* gas production method, and therefore, are not likely to adversely affect ruminant productivity.

- A spectrophotometric method based on rhodanine and an HPLC method for gallotannins have been compared for 38 tree and browse samples. The specificity and sensitivity of the HPLC method was higher than those of the rhodanine method. However, similar results were obtained by the two methods for the samples containing considerable levels of gallotannins of physiological significance. Using the HPLC method, 24 samples had negligible gallotannin levels (as gallic acid equivalent) (<0.1%), 9 samples between 0.1 and 0.5%, *Dichrostachys cinerea* 0.73%, *Acacia giraffae* and *Calliandra calothyrsus* 2% and 1.6% respectively, *Eucalyptus macrophylla* 3.6% and *A. hockii* 14%.

- A new and simpler spectrophotometric method, based on methanolysis of hydrolysable tannins to methylgallate and followed by its reaction with potassium iodate, has been developed under the project.

- The ^{125}I-labelled BSA method for tannin assay is being simplified under a Technical Contract and will be available for use by the Research Contract holders in the second stage.

- The work plan and project framework matrix have been formulated for the participating groups.

- The venue for the next RCM will be Turkey.

Recommendations

- A battery of tannin assays: total phenols, total tannins, condensed tannins, radiolabelled BSA method, and percentage increase in gas production on inactivation of tannins by PEG is required to predict the biological response of feeding tannin-containing diets to ruminants.

- For initial screening of a large number of samples, the two simple assays: total phenols and total tannins could be undertaken.

- The second phase of the CRP should be initiated as of December 2001. The main thrust in the second phase should be on using the above mentioned validated tannin assays to evaluate strategies to detanninify tannin-rich tree leaves and browses using simple and economically viable approaches, and to exploit the full benefits of tanniniferous plants as animal feed supplements and as strategic feed reserves in situations of fluctuating nutrient supply. All participating groups should undertake work on this common theme. High tannin forages of economic importance for the region should be selected for these studies. Other nutrients and anti-nutrients are important factors which should be considered while studying the effects of tannins *in vivo*. Three groups should also conduct studies on: mechanisms of adaptation to tannins by ruminants (Tunisia); fate of tannin-inactivating agent PEG, PEG-tannin and PEG-tannin-protein complexes in soil using ^{14}C-PEG (Brazil); and development of a radiolabelled BSA-based model to investigate the mechanism of tannin interactions in the gastrointestinal tract (Australia). Further work will continue on the development of the chick model for by-pass protein utilization under an arrangement with an Agreement holder's laboratory.

- A Technical Contract should be awarded for development of the radiolabelled-based model. This model will enable exploitation of various tannins for enhancing protein availability in ruminants.

- The potential of tannins for use as anthelminths was recognized by the group, but it was not included as a mandatory component in the second phase due to the need to focus our efforts and the time constraint.

- The new method for determination of hydrolysable tannins (methanolysis followed by reaction with potassium iodate); and the simpler radiolabelled BSA method, being developed at present, should be included for use in the second phase.

- The protocols for the new method for hydrolysable tannins should be included in the Working Manual on Tannin Assays and this manual should be published as an IAEA-TECDOC.

- The relationship between tannin contents, with intake, should be further investigated.

- At least four new Research Contract holders should be sought for the second phase of the CRP. Training on tannin assays should be provided to the new Contract holders to enhance their knowledge and skills on the tannin assays to the same level as the current Research Contract holders, thus ensuring standardization of results across laboratories.
- The work plan developed during this RCM is both resource- and time-demanding. At least US$ 9,000 per annum should be allocated to each Contract holder, and the final RCM should not be held before March 2004.
- Data in a common format should be circulated to all participants at least two months prior to the next RCM.
- The Research Contract holders should submit a progress report every 6 months.

Integrated Approach for Improving Small-Scale Market Oriented Dairy Systems (D3.10.23)

Project Officer: Oswin Perera

This CRP now has a full complement of participants and no further awards are possible. The first RCM was held from 8 to 12 April 2002 in Vienna, and the second RCM is scheduled for 21-25 July 2003.

The list of participants is given below:

Research Contracts	Country	Name
11806/RB	Bangladesh	Mohammed Shamsuddin
11807/RB	Cameroon	Henri Dieudonné Bayemi Pougue
11809/RB	Pakistan	Abdul Ghaffar
11877/RB	Paraguay	Nidia Balbina Ferreira
11811/RB	Peru	Carlos Gómez
11812/RB	South Africa	Leon Prozesky
11813/RB	Sri Lanka	Harischandra Abeygunawardena
11814/RB	Tunisia	Jamel Rekhis
11878/RB	URT	Beda M. Kessy
11818/RB	Venezuela	Pablo Herrera Díaz
Research Agreements		
11808/RB	Malaysia	Canagasaby Devendra
11815/RB	United Kingdom	David Whitaker
11816/RB	Uruguay	Daniel Cavestany
11817/RB	USA	William Goodger
Technical Contract		
11810/RB	Peru	Mario García-Podesta

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

This is the final year of the CRP and the setting up of routine PCR for the diagnosis and differentiation of vesicular viruses in the Research Contract holders' laboratories can be regarded as complete. Full reports of the work will be made as well as a set of working protocols based on the experience of the Research Contract holders. This will be published as an IAEA-TECDOC in 2003. The technology was transferred and is now available. The main problem in most laboratories is the sustainability of the technology and the lack of field activity and sending of appropriate samples for examination.

A manual dealing with all fundamental aspects of PCR applied to veterinary diseases will be published and will include contributions from Research Contract holder donations.

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

Technical Officer: Martyn Jeggo

This CRP has eleven Research Contracts, three Research Agreements and one Technical Contract for penside test development. The main objective of the CRP is to validate, standardize and utilize the competitive ELISA for the detection of antibodies to contagious bovine pleuropneumonia (CBPP) through field studies in different African countries. The next and final RCM will be held in Mali in 2003 in conjunction with an FAO CBPP programme in West Africa.

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: Martyn Jeggo

The third Research Co-ordination Meeting took place in Quatre Bornes, Mauritius, from 6 to 10 May 2002. A report of this meeting is given on page 15 of this Newsletter.

There are currently twelve Research Contract and five Agreement holders.

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 RCM took place from 4 to 8 March 2002, in Geelong, Australia. A report of this meeting is given on page 8 of this Newsletter.

Developing, Validating and Standardizing Methodologies for the Use of PCR and PCR-ELISA in the Diagnosis and Monitoring of Control and Eradication Programmes for Trypanosomosis (D3.20.21)

Technical Officer: John Crowther

The Universal primers ITS1 primers to allow detection of trypansomes have been evaluated by the Brazilian Research Contract holder and the sequences sent to Seibersdorf. The primers have been synthesized and are being evaluated. John Enyaru (Uganda) has received the primers directly from Brazil.

Kits to measure antibodies against *T. congolense* and *T. vivax* utilizing denatured antigen pre-coated plates have been sent to various laboratories in the CRP. Kits have also been supplied to Haute Guinea, and are being used constantly with great success under a TC project in Ethiopia.

Zablon Njiru has taken over the Research Contract at Ketri, Kenya. He is evaluating whether the technology for the kits produced at Seibersdorf can be transferred to Ketri in the near future.

Reference DNA for Seibersdorf laboratories, Vienna, has been promised from Brazil. .

The Development of Strategies for the Effective Monitoring of Veterinary Drug Residues in Livestock and Livestock Products in Developing Countries (D3.20.22)

Technical Officer: Andrew Cannavan

Research Contracts have currently been awarded to participants from Barbados, Brazil, Indonesia, Kenya, Namibia, Korea, Sri Lanka, Thailand and Turkey. Research Agreements have been awarded to researchers in Germany, UK and Sweden. The focus of the CRP is on the development of sampling procedures, the application of screening technologies such as ELISA and RIA, post-screening methods such as HPLC, and approaches towards laboratory accreditation. Initial work has already commenced at the laboratory of one of the Research Agreement holders on the application of solid-phase, ^{125}I RIA methods to drug residues analysis. The application of an optical biosensor to residues analysis is currently being investigated at the Agency's laboratories at Seibersdorf. Currently, the most common compound in terms of drug residues is probably chloramphenicol (CAP), which is affecting trade mainly from East

Asia, but which will undoubtedly have a global impact. CAP will, therefore, be one of the main compounds to be included in many of the work plans formulated at the first RCM, which will be held from 2 to 6 September 2002 in Vienna.

African Swine Fever

Technical Officer: John Crowther

Technical Contract 11294 (D3.00.00)

Production and distribution of Indirect ELISA kits for the detection of antibodies against African Swine Fever (ASF) virus

The kits have been developed by Mariame Diop, Institut Sénégalais de Recherches Agricoles ISRA, Laboratoire National de l'Elevage et de Recherches Vétérinaires (LNERV).

Indirect ELISA kits for the detection of antibodies against ASF are now circulated and comprise antigen and control sera from CISA –INIA, 28130 Valdeolmos, Madrid, Spain and protein A conjugated to horse radish peroxidase. Validation data for the ASF kit is available. The kits will be distributed to selected laboratories and can be also purchased from the Senegal laboratory by arrangement with M. Diop. This is an encouraging landmark in the sustainable supply of kits in Africa.

E. NEW CO-ORDINATED RESEARCH PROJECTS

Development and Use of Rumen Molecular Techniques for Predicting and Enhancing Productivity

Technical Officer: Harinder Makkar

1. Introduction

The world's livestock sector is amidst a massive transformation, fuelled by high demand for meat and milk, which is likely to double over the next two decades in developing countries. The major driving force behind this soaring demand for livestock products is a combination of population growth, urbanization and income growth, especially in developing countries. The challenge is to enhance animal productivity without any adverse effects on the environment.

The major limitation to ruminant production in many tropical regions of Africa, Asia and Latin America is poor nutrition. The productivity of animals is restricted by the low nitrogen and high fibre content of the native grasses and crop residues which form the basis of the diets in these regions. Chemical treatment of fibrous feedstuffs, supplementation of tropical roughages with leguminous fodder trees and shrubs (FTS) and low-cost nitrogenous sources, and use of agricultural by-products are promising methods to alleviate nutrient deficiencies associated with these basal diets. FTS often contain secondary compounds (e.g. tannins, saponins, phenolic glycosides) which can affect discrete populations of micro-organisms in the rumen.

A large proportion of the global ruminant population are located in tropical environments where animals feed predominantly on low quality highly fibrous forages. Recent studies in respiration chambers have confirmed that methane emissions from ruminants fed on fibrous diets are higher than outputs from better quality temperate forages. The excretion of methane from the rumen can represent a loss of 8–10% of the digestible energy depending on the type of diet. Therefore, reducing methane production could benefit the ruminant energetically provided the efficiency of ruminal metabolism is not compromised. Animal trials involving agents that specifically inhibit microbial enzymes associated with methane production probably provide the most reliable data for interpretation of the effects of inhibition of methanogenesis on digestive and animal performance parameters. This data indicates that a reduction in methanogenesis in the rumen can be associated with improvements in feed conversion efficiency without affecting intake. Furthermore, any attempt to reduce methane emissions from livestock is unlikely to be adopted unless production efficiency is at least maintained if not enhanced. The challenge, therefore, is to devise strategies which reduce methane emissions from ruminants and improve production efficiency.

2. Rationale

Current approaches to the evaluation of digestibility and nutritive value of feed resources using conventional *in vitro* feed evaluation and animal studies have resulted in a large body of information about nutrient composition, digestion kinetics and digestibility. However, these techniques are unable to describe the mechanisms involved in ruminal digestion, and are unlikely to

result in the development of innovative technologies to improve animal productivity from available feed resources.

Gene-based technologies have the potential to improve the nutritive value of ruminant feedstuffs that are fibrous, low in nitrogen and contain anti-nutritive factors. Until recently, our knowledge of rumen microbiology was primarily based on classical culture based techniques (isolation, enumeration and nutritional characterization) which probably only account for 10 to 20% of the rumen microbial population. New gene-based technologies are being employed to examine microbial diversity through the use of 16S rDNA analysis and to understand the function of complex microbial ecosystems such as the rumen. These technologies have the potential to revolutionize our understanding of rumen function and will enable us to overcome current limitations in rumen biotechnology, which include isolation and taxonomic identification of strains important to efficient rumen function. The future of rumen microbiology research is dependant upon the adoption of these research technologies. However, the challenge is how we utilize these technologies to improve ruminant production through a better understanding of microbial function and ecology.

These molecular based ecology techniques are likely to provide insight into the interactions between methanogens and the other rumen micro-organisms, which should lead to strategies for improving production by reducing methanogenesis. The impact of reduced methane production on rumen fermentation has not been clearly elucidated, although it appears that the degree of inhibition of methane production is an important determinant of the associated effects on feed intake, feed digestibility and animal production efficiency. A consequence of inhibiting methanogens is the accumulation of H_2 in the rumen that is a major metabolic end-product of forage digestion. The management of H_2 accumulation in the rumen under these circumstances is a critical factor, which will determine the efficiency of digestion and animal performance. When hydrogen accumulates in the rumen, bacteria shift their fermentation pattern to acetate from more reduced end-products such as propionate. The adaptive changes in rumen microbial ecology to inhibition of methanogens is relatively unknown, although enhanced propionate production is a consistent response and consequence of disruption to interspecies hydrogen transfer. One strategy to prevent H_2 accumulating in the rumen is to provide dietary substrates that are precursors for propionate production by fermentative bacteria. Increase in the efficiency of microbial protein synthesis has also been observed with decrease in methane production.

3. Overall objective

To improve ruminant performance through a reduction in methane production.

4. Specific research objectives

4.1. Reduce the level of methane production by up to 50% in animals fed roughage diets.

4.2. Increase microbial protein and energy supply through reduced methane production using approaches such as inhibitors of methanogens, dietary approaches (e.g. use of polyunsaturated fatty acids or ingredients containing these acids), supplementation strategies, etc.

4.3. Build in-country capacity to develop and use molecular techniques for studying rumen function.

Develop molecular probes for quantifying populations of methanogens, fibre degrading bacteria, fungi and protozoa.

Correlate methane production to methanogen numbers.

Determine effects of reduced methanogen numbers on fibre degrading bacteria, fungi and protozoa.

Identify naturally-occurring plant secondary compounds that inhibit methanogens.

5. Expected research outputs

- Feeding strategies and/or supplements that reduce methane production and improve productivity in ruminants on tropical diets.
- Development and application of molecular probes and techniques for studying rumen microbial ecology and effects of novel feed additives and dietary approaches.
- Increased capacity of NARS to integrate molecular rumen techniques into research programmes on ruminant nutrition.
- Improved knowledge of ecology of rumen micro-organisms, particularly methanogenic archaea and their interaction with predominant rumen micro-organisms.
- Published and disseminated research results.

Proposals

Scientists working in countries in Africa, Asia, and Latin America, where novel feeding strategies are being evaluated for improving ruminant

production, are requested to submit research proposals using the appropriate forms (Research Contract Proposal). The closing date for submission of proposals has been extended until 30 April 2003. A Training Workshop on molecular and nuclear techniques required for achieving the objectives of the project will be organized in 2004. The contents of the proposal submitted will form one of the criteria for selection of candidates for the Training Workshop. The project will become operational in January 2005.

Proposals should describe the expertise of the group in rumen microbiology and biochemistry, availability of laboratory equipment and capability in the areas of anaerobic microbiology and molecular techniques, experimental design (for example number of samples, number of animals, geographical area, parameters, sampling techniques, experimental animals, etc.) for evaluation of feeding systems and approaches to improve production and reduce methane. In addition, the expected output and benefits (for the laboratory, the farmers and the country) should be indicated.

For further information on Co-ordinated Research Projects, please see "General Information" on page 27.

Improvement of Animal Productivity in Developing Countries by Manipulation of Nutrition *in utero* to Alter Gene Expression

Technical Officers: Oswin Perera and Harinder Makkar

1. Rationale

1.1. Demonstrated scientific basis of concept: Solid and well validated recent research in humans, rats, mice and sheep has shown that nutritional status of the pregnant mother/dam can induce life long changes in gene expression of many key metabolic systems in the progeny.

1.2. Demonstrated impact of concept: Impact of above interventions on glucose metabolism in humans and rodent models is so extensive that it can result in metabolic diseases such as diabetes leading to substantial effects on morbidity.

1.3. Applicability to farming systems in developing countries: Research has shown that nutrition *in utero* under practical (un-supplemented) commercial farming conditions does induce changes in gene expression of the insulin axis in sheep at an age when these animals would be in the economically important finishing phase. The nutritional interventions required can easily be implemented at village level.

1.4. Potential impact for farming systems in developing countries: Concept is new and well validated in model species and humans but has never been applied in livestock production systems. Impact in livestock is unknown but above evidence suggests the impact in ruminants could be even more extensive because

a. this species has a precarious glucose/insulin metabolism (glucose supply is critical for many metabolic processes such as lactation, pregnancy, fattening, because very little glucose is absorbed, particularly in forage-based developing country nutritional systems) -> potential to improve milk yield and meat quality via simple nutritional manipulation that changes gene expression of insulin and other key metabolic regulators of homeorhesis;

b. gene expression of the insulin/glucose axis is critical for synthesis/utilization of endogenous adipose energy reserves, the metabolism of which impacts on reconception and puberty - potential to improve reconception via simple nutritional manipulation that changes gene expression of insulin and other key metabolic regulators of homeorhesis;

c. gene expression of the immune system -> potential to improve disease resistance via simple nutritional manipulation that changes gene expression of key regulators of the immune system;

d. characterization of gene expression responses to nutrition will lend functionality to studies of genetic diversity;

e. capacity in physiological genomics in developing country NARS will be initiated and developed; protocol has flexibility to enable powerful gene-related techniques such as cDNA microarrays to be introduced as these technologies mature and become available.

1.5. Ease of implementation in farming systems in developing countries: This project would utilize simple and proven IAEA nutritional supplementation strategies, but would extend the investment made thus far by exploring a hitherto unexploited dimension that has potential to increase uptake.

2. Overall objective

To improve animal productivity in developing countries by manipulation of nutrition *in utero* to alter gene expression.

3. Specific research objectives

- Proof of concept: Provide a definitive answer to the question: Does plane of nutrition *in utero* alter gene expression of key metabolic hormones and enzymes for a long period after birth in cattle?
- Quantify the relative impact of pre *vs.* post natal supplementation strategies in cattle.
- To build in-country knowledge and capacity in the use of gene-related techniques for measuring gene-expression, physiological genomics and radioimmunoassay.

4. Expected outputs

4.1. Improved knowledge of the effects of nutrition during pregnancy on foetal programming in ruminants.

4.2. Improved knowledge of the relative benefits of supplementary feeding during pregnancy vs. lactation.

4.3. Increased capacity of NARS to integrate techniques for measuring gene expression and RIA into research programmes.

4.4. Published and disseminated research results.

4.5. Collaborative linkages established.

5. Outcomes and impacts

- Supplementary feeding strategies for pregnant animals implemented by farmers.
- Increased animal productivity through altered gene expression.

Proposals

Scientists working in countries in Africa, Asia and Latin America are requested to submit research proposals using the appropriate forms ('Research Contract Proposal'). The closing date for submission of proposals is 30 April 2003. A Training Workshop on molecular and nuclear techniques required for achieving the objectives of the project will be organized in 2004. The contents of the proposal submitted will form one of the criteria for selection of candidates for the Training Workshop. The project will become operational in January 2005.

Proposals should describe the expertise of the group in gene expression and gene-related techniques, radioimmuno assay; availability of laboratory equipment and capability in the areas of anaerobic microbiology and molecular techniques; experimental design (for example number of samples, number of animals, geographical area, parameters, sampling techniques, experimental animals, etc.). In addition, the expected output and benefits (for the laboratory, the farmers and the country) should be indicated.

For further information on Co-ordinated Research Project, please see "General Information" below.

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, UNDP offices or by contacting the Technical Officer. The form can also be downloaded from the Website: http://www.iaea.org/programmes/ri/uc.html

Such proposals need to be countersigned by the Head of the Institutions 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 one month. Such support is available to IAEA Member States.

F. TECHNICAL CO-OPERATION PROJECTS

Operational Projects in 2001/2002
(Number, Title, Technical Officer)

ARG/5/010, IMPROVING TUBERCULOSIS DIAGNOSIS IN RUMINANTS USING PCR, John Crowther

BGD/5/023, DEVELOPMENT OF AGROFORESTRY-BASED LIVESTOCK PRODUCTION SYSTEMS, Harinder Makkar

BKF/5/002, DEVELOPMENT OF A VETERINARY MEDICINE TO COMBAT THE FOWL POX IN POULTRY FARMING, Martyn Jeggo

BOL/5/014, DIFFERENTIAL DIAGNOSIS OF FOOT-AND-MOUTH DISEASE, John Crowther

CMR/5/009, NUCLEAR TECHNIQUES FOR IMPROVING LOCAL RUMINANT PRODUCTIVITY, Harinder Makkar

COL/5/020, USE OF PROTEIN BANKS FOR IMPROVING PORK PRODUCTION, Harinder Makkar

CPR/5/014, INCREASING PRODUCTIVITY OF CROP-LIVESTOCK PRODUCTION SYSTEMS, Harinder Makkar (Associate Staff)

CYP/5/019, ACCREDITATION OF LABORATORY FOR CONTROL OF FOODS OF ANIMAL ORIGIN, Andrew Cannavan

ELS/5/009, IMPROVING CATTLE PRODUCTION AND QC FOR MONITORING OF ANIMAL DISEASES, Oswin Perera, Axel Colling

ETH/5/012, INTEGRATING SIT FOR TSETSE ERADICATION, Martyn Jeggo

INS/5/029, SUPPLEMENTARY FEEDING AND REPRODUCTIVE MANAGEMENT OF CATTLE, Oswin Perera, Harinder Makkar

INS/5/032, IMPROVING BEEF AND DAIRY CATTLE PRODUCITON IN YOGYAKARTA, Oswin Perera

MAL/5/025, FOOD SAFETY MONITORING PROGRAMME FOR LIVESTOCK PRODUCTS, Andrew Cannavan

MAT/5/003, SURVEILLANCE OF PROGRAMMES FOR CONTAMINANTS IN FOODS OF ANIMAL ORIGIN, Andrew Cannavan

MEX/5/036, IMPROVING THE REPRODUCTIVE PERFORMANCE OF PELIBUEY SHEEP IN TROPICAL MEXICO USING LOCAL FEED RESOURCES, Harinder Makkar

MON/5/011, INTEGRATED APPROACH FOR FIELD MANAGEMENT OF ANIMAL PRODUCTION AND HEALTH, John Crowther, Harinder Makkar

MOR/5/027, MONITORING OF VETERINARY DRUG RESIDUES, Andrew Cannavan

MYA/5/011, DEVELOPMENT OF SUPPLEMENTARY FEEDING STRATEGIES BASED ON LOCAL FEED SOURCES, Harinder Makkar

MYA/5/012, DIAGNOSIS AND CONTROL OF SWINE VESICULAR DISEASE AND SWINE BRUCELLOSIS, John Crowther

NAM/5/006, MONITORING OF VETERINARY DRUG RESIDUES IN LIVESTOCK, Andrew Cannavan

PAK/5/041, SETTING UP IMMUNOASSAY AND MOLECULAR-BASED METHODS TO MONITOR AND SURVEY RINDERPEST DISEASE, John Crowther

POL/5/010, INCREASING PIG PRODUCTIVITY THROUGH RADIOIMMUNOASSAY TO DETERMINE METHODS FOR ADVANCING PUBERTY IN GILTS, Oswin Perera

RAF/5/046, INCREASING AND IMPROVING MILK AND MEAT PRODUCTION, Oswin Perera

RAF/5/053, ASSISTANCE TO OAU/IBAR PACE PROGRAMME FOR THE CONTROL AND ERADICATION OF MAJOR DISEASES AFFECTING LIVESTOCK, Martyn Jeggo, Mamadou Lelenta

RAS/5/035, BETTER MANAGEMENT OF FEEDING & REPRODUCTION OF CATTLE (RCA), Oswin Perera, Harinder Makkar

RLA/5/046, SUSTAINABLE ANIMAL PRODUCTION ON LANDSCAPES OF VENEZUELAN-COLOMBIAN ORINOQUIA, Harinder Makkar

SRL/5/035, MONITORING AND CONTROL OF RESIDUES IN LIVESTOCK PRODUCTS, Andrew Cannavan

SUD/5/025, IMPROVING PRODUCTIVITY OF GOATS, Oswin Perera

SUD/5/027, CONTROL OF TICKS AND TICK-BORNE DISEASES USING ELISA, Martyn Jeggo

URT/5/021, LIVESTOCK DEVELOPMENT IN ZANZIBAR AFTER TSETSE ERADICATION, Oswin Perera, Harinder Makkar, Martyn Jeggo

VEN/5/021, SUSTAINABLE ANIMAL PRODUCTION, Harinder Makkar

YEM/5/004, IMRPOVING THE DIAGNOSIS OF ANIMAL DISEASES, John Crowther

RAF/0/013 – ICT-BASED TRAINING TO STRENGHTEN LDC CAPACITY

Information and communication technologies (ICT) and, in particular, the internet hold a great potential for the training of scientists in developing countries who have only limited access to scientific and other information through regular scientific journals and circulars.

The main focus of the IAEA Technical Co-operation Project – RAF/0/013 – "ICT-BASED TRAINING TO STRENGHTEN LDC CAPACITY" is to use ICT technologies to help counterparts in least developed countries to bridge the digital divide. Roland Geiger worked for the last six months as a consultant within the Animal Production and Health Section and in co-operation with IAEA's Department of Technical Co-operation, and two CDs were produced which contain training material in a web-based format.

One CD is aimed at AI technicians to improve their performance in the field aspects of AI which are essential for the effective use of this technology in rural areas, and to contribute to more efficient, sustainable and cost-effective national AI services leading to improved livestock productivity through the successful introduction of advantageous genetic characteristics in indigenous and cross-bred animals.

The other CD is aimed at field veterinarians, animal health workers and decision makers working on the eradication of rinderpest to give background information on the surveillance and diagnosis of rinderpest and the OIE pathway.

Online access to the Internet is still difficult and slow in many developing countries. That is the main reason that these training packages are initially distributed on CDs making their use independent of Internet access. This includes also the establishment of "telecentres" which contain computers, printers, publishing and multimedia equipment. The ICT support for eradication of rinderpest is focused on Ethiopia and Sudan, and the support for the AI services is focused on Tanzania and Uganda. In these pilot projects, telecentres were established in these countries which will serve also as a resource for extension and training activities in AI and the diagnosis and surveillance of rinderpest. Full details of the two CDs are described below.

CD for the Diagnosis of Rinderpest and Preparation for the OIE Pathway

The training CD is linked to further IAEA support to establish telecentres for training activities. A copy of the CD can be obtained from the Animal Production and Health Section.

This CD contains three different modules. One module is targeted at field veterinarians and animal health workers to assist with the recognition and investigation of rinderpest outbreaks.

The second module assists decision makers to plan the activities of the national veterinary services to proceed on the OIE pathway.

A third module contains the background information in connection with the diagnosis of rinderpest and the OIE pathway such as manuals, protocols and the OIE Code.

- Module for veterinarians and animal health workers
    - Clinical diagnosis of rinderpest;
    - Collection and submission of samples for the diagnosis of rinderpest;

    - Diagnosis of other viral diseases.
- Module for decision makers to prepare for the OIE pathway
    - Rinderpest surveillance and the components of the OIE Pathway;
    - The OIE Pathway – stages of the OIE Pathway;
    - Preparing for the OIE Pathway.
- Module with background information
    - Manual on the preparation of rinderpest contingency plans;
    - Disease Strategy Rinderpest, AUSVET PLAN;
    - Disease Strategy Rinderpest;
    - Rinderpest - peste des petits ruminants ELISA kit;
    - Rinderpest ELISA kit;
    - Guidelines for the use of Performance Indicators;
    - The World Without Rinderpest;
    - Guide to epidemiological surveillance for rinderpest;
    - International Animal Health Code – Rinderpest;
    - Manual of standards for diagnostic tests and vaccines – Rinderpest;
    - Recognizing peste des petits ruminants;
    - Veterinary Epidemiology, An Introduction;
    - Emergency Preparedness Plan – Rinderpest.

Training CD on artificial insemination of cattle

A training package was produced to help artificial insemination (AI) technicians to improve the performance of the AI and to improve the field services provided to farmers. This CD can be obtained from the Animal Production and Health Section.

The following modules are contained on this CD:

1. General aspects of reproduction, describing the background of the reproductive cycle and giving details on the reproductive organs.
2. Heat detection, describing how the farmer can detect whether his cows are in heat and whether they are ready for insemination.
3. Semen handling, describing how to handle the semen which is stored in liquid nitrogen prior to the insemination.
4. Timing of AI, describing the optimal timing of the artificial insemination.
5. Insemination, describing the correct insemination technique and the placement of the semen in the cow.
6. Non-pregnancy diagnosis, describing the background of NP diagnosis and the use of the progesterone assay in NP diagnosis.
7. Limitations of heat detection, describing the problems and constraints in heat detention.
8. References, a collection of resources and documents on AI which are contained on the CD.
9. Links, a collection of links on the World Wide Web with further information on cattle reproduction and AI.

G. ACTIVITIES OF THE ANIMAL PRODUCT UNIT (APU) AT THE FAO/IAEA AGRICULTURE AND BIOTECHNOLOGY LABORATORY

Foot-and-Mouth Disease (FMD) Kits

Development of a new FMD serological test based on the use of the FMDV non-structural protein (NS). In the Frame of the CRP on the Use the NS-based ELISA to differentiate FMDV vaccinated from infected animals, the Animal Production Unit (APU) of the FAO/IAEA Agriculture and Biotechnology Laboratory, Seibersdorf, has started collaboration with the University of Vienna to develop a cELISA-based test. APU is in charge of producing the recombinant NS protein to be used as antigen while the test itself will be developed at the University. By recombinant technology, a Histidin-tagged FMD NS protein has been produced in the baculovirus vector. Work is underway to purify this protein. Dr. Blesilda C. Verin from the Philippines, who has been granted a 6-months fellowship from IAEA, is participating in this work.

Rinderpest/peste des petits ruminants diagnostic tests (RP/PPR)

In the frame of the Pan-African Campaign against Epizootics (PACE) supported by the European Union (EU), a research proposal has been submitted to OAU/IBAR to develop new and specific RP/PPR diagnostic tests, RP and PPR marked vaccines. The Animal Production Unit (APU) will be a partner in that project along with CIRAD-EMVT (France) and the Institute of Animal Health-Pirbright Laboratory (UK). APU will be involved mainly in the development of new diagnostic tests by producing new monoclonal antibodies and also new recombinant antigens. This work has started already. The full gene of the rinderpest virus nucleocapsid protein has been introduced into the baculovirus genome to produce recombinant antigen. The following have also been produced in the same:

- the full length of PPRV NP protein,
- the PPRV Np protein deleted between amino-acids numbers 120 and 145,
- the PPRV NP protein deleted between amino-acids numbers 420 and 525 (fragment corresponding to c-terminal of the normal protein).

This c-terminal fragment deleted in the above protein has been expressed separately in an-vitro translation system as a fusion protein to a Hist-tag tail. This peptide will be inoculated very soon to mice in view to produce hybridomas and monoclonal antibodies.

It is expected to produce 6-7 deleted recombinant PPRV NP proteins to be tested as suitable for PPR specific serological diagnosis.

Dr Charles Bodjo, from Côte d'Ivoire, who has been awarded a 1-year training grant by TC in APU is working on this project.

Trypanosomosis

1) CRP on the Developing, Validating and Standardizing Methodologies for the Use of PCR and PCR-ELISA in the Diagnosis and Monitoring of Control and Eradication Programmes for Trypanosomosis (D3.20.21)

To build up a bank of reference Trypanosoma DNAs, samples have been received in Seibersdorf from Colombia, Brazil, Uganda and Burkina Faso.

The partner from Brazil has developed trypanosoma universal primers (ITS1) and has sent their sequences to Seibersdorf. They have been synthesized and successfully tested, but using conditions that were different from those recommended by the partner.

2) Trypanosoma ELISA kit

The ELISA kits which have been developed in APU for the serodiagnosis of infections caused by *T. congolense* and *T. vivax* have been distributed to partners involved in the above CRP.

Veterinary Drug Residues

The Animal Production Unit is currently being equipped with instrumentation for techniques such as HPLC to support both training and technical back-up activities for TCPs and the CRP on veterinary drug residues. Work has commenced on the development of simplified HPLC methods for the detection and quantitation of residues of the widely used, broad-spectrum antibacterial, tetracycline compounds. A simplified method for the measurement of chlortetracycline, tetracycline and oxytetracycline in milk has been produced and further investigations will be carried out to optimize the chromatography in terms of analytical performance, ease of application and cost. An optical biosensor has been evaluated to gauge its applicability to residues testing in Member States. The instrument was tested using a commercially available kit for the measurement of the aminoglycoside antibiotics, streptomycin and dihydrostreptomycin, in various matrices including honey, muscle and kidney tissue. These compounds are of current interest since residues have been found in honey products originating in China. This was a contributory factor in the EU decision to suspend imports of products of animal origin from China due to concern over the lack of controls on these and other veterinary drugs and highlights the increasing need for veterinary drug residues monitoring programmes in Member States to support international trade. The biosensor instrument performed well in the analysis of these compounds and, if the initial high cost of the instrument can be offset by high sample throughput, this technology may prove suitable for use in such programmes.

Quality Assurance Programme for Animal Disease Diagnosis.

Discussions about the implementation of INT/0/060 "Establishing Quality Systems in Veterinary Testing Laboratories" where held with counterparts and experts from Peru, Malaysia, Philippines, Thailand and Australia during an international FMD conference in Geelong, Australia.

It was agreed that:

1) An updated version of the "Guidelines for Establishing Quality Systems in Veterinary Testing Laboratories" will be translated into French and Spanish. This version includes chapters about a) Estimation of Measurement Uncertainty and b) Occupational Health and Safety. The latter ones are not part of the OIE standard but are recommended as part of good laboratory practice.

2) The implementation of the project was according to the work plans as established at the meeting in South Africa, July 2001.

3) Individual progress reports will be produced to monitor the implementation of quality systems in each laboratory according to the established work plans.

4) Participants will give inputs (list of laboratories, national commitment, status of implementation of the quality system, accreditation, etc.) regarding laboratories in their country and region, which have a suitable infrastructure to establish quality systems within the extension of the TC project in each region. This information is crucial for the elaboration of the proposal for a project extension.

5) A proposal for an extension of TC project INT/0/060 for 2003/2004 into suitable laboratories in each region will be presented to the Department of Technical Co-operation.

6) Forthcoming expert visits will be carried out as external audits and audit reports will be produced. This would be a realistic exercise and give evidence where the laboratory still needs to improve its quality system.

7) Two EQA rounds are planned in 2002 for the participants of INT/0/060. These rounds focus on ELISAs for brucellosis and FMD.

Proficiency test rounds are planned for the CRPs concerned with the use of PCR for animal disease diagnosis and in the area of veterinary residues.

The following EQA interim reports and other QA related documents are now available on the webpage of the Animal Production and Health Sub-programme:

- The External Quality Assurance Programme for use with the FAO/IAEA indirect **Brucellosis** ELISA, Interim Report (BRA/1999b) 2000.
- The External Quality Assurance Programme for use with the FAO/IAEA indirect **Brucellosis** ELISA, Interim Report (BRA/1999a) 2000.
- The External Quality Assurance Programme for use with the FAO/IAEA indirect **Brucellosis** ELISA, Interim Report (BRA/1998b) 1999

- The External Quality Assurance Programme for use with the FAO/IAEA indirect **Brucellosis** ELISA, Interim Report (BRA/1998a) 1999
- The External Quality Assurance Programme for use with the FAO/IAEA indirect **Brucellosis** ELISA, Interim Report (BRA/1997a) 1998.
- The External Quality Assurance Programme for use with the FAO/IAEA indirect **Brucellosis** ELISA, Interim Report (BRA1996a)1997
- The External Quality Assurance Programme for use with the FAO/IAEA indirect **Brucellosis** ELISA, Interim Report (BRA1995a)1996
- The External Quality Assurance Programme for use with the FAO/IAEA **FMD** Antibody ELISA, Interim Report (FMD/1998a) 1999.
- The External Quality Assurance Programme for use with the FAO/IAEA **FMD** Antibody ELISA (FMD/1996a) , Interim Report (incomplete)
- The External Quality Assurance Programme for use with the FAO/IAEA **Rinderpest** Competitive ELISA, Interim Report (RP/1998a) 1999.
- The External Quality Assurance Programme for use with the FAO/IAEA **Rinderpest** Competitive ELISA, Interim Report (RP/1997a) 1998.
- The External Quality Assurance Programme for Use with FAO/IAEA **Rinderpest** Competitive ELISA, Interim Report (RP/1996a), 1997.
- The External Quality Assurance Programme for Use with FAO/IAEA **Trypanosomosis** Direct Sandwich ELISA for the Detection of Antigens of T.Brucei, T. Congolense and T.Vivax., Interim Report (TRYP/1996a), 1997.
- QA-questionnaires for FMD, Rinderpest and Brucellosis
- The FAO/IAEA External Quality Assurance Programme (EQAP) and Movement Towards a Generic Veterinary Diagnostic Testing Laboratory Accreditation Scheme. FAO/IAEA Consultants Meeting, IAEA, Vienna (1998)
- Establishment of External Quality Assurance Procedures with FAO/IAEA ELISA Kits, Consultants Meeting, IAEA, Vienna (1994).

H. GEOGRAPHICAL INFORMATION SYSTEMS

Software

ArcGis version 8.1 is now available in the Section with 3 Extensions, which are Spatial Analyst, 3D Analyst and Geostatical Analyst. This complete vector-oriented GIS system involves more powerful computers in term of fast CPU and more memories (RAM and Hard disks). The full compatibility between ArcView 3.1 and ArcGIS in term of goereference data allows a wider range of possibilities for data processing.

Land use land cover survey

Avia-Gis (Belgium private company) conducted a consultancy on 'Land Use Monitoring in Areas Selected for Area-wide Tsetse Elimination in West Africa'. A series of meetings have been held to support the studies during the presence of the Avia-Gis expert in the Agency (from 28 January to 8 February 2002). Two full months are required for the GIS Unit to process 72 Landsat satellites images scenes for Land use and Land cover survey in West Africa. The coming months will be focused on Remote Sensing data processing.

Training course in Ouagadougou

From 6 to 24 May 2002, a Regional Training course on the Use of GIS in Tsetse Intervention and Land-use Planning in Tsetse Free Areas was held in Ouagadougou, Burkina Faso. Prior to this Workshop, a meeting was held in Rome (from 4 to 8 March 2002) to prepare the manual of the course.

Tsetse flies project

Twelve Landsat satellite TM images have been acquired covering the Mali tsetse fly project (MLI/5/0170). Using bands 4, 3, 2 some False colour composite images have been produced. These output highlighted drainage pattern and vegetation in two different seasons of the year (dry and wet season). In order to extract more spatial information from the images, a proposal for land use and land cover survey has been submitted to TC.

Following field surveys using traps, data has been continually overlaid on satellite images in the project area; this has provided an overall view of the state of survey and to manage the location of the traps.

Fruit flies project

The projects EGY/5/025, IRS/5/010, JOR/5/009 and PAL/5/002 obtained 11 Landsat satellite TM images. Using existing survey data some outputs have been produced using satellite images.

I. PUBLICATIONS

Published:

Proceedings of the second RCM of the Co-ordianted Research Project on "The Assessment of the Effectiveness of Vaccination Strategies against Newcastle Disease and Gumboro Disease Using Immunoassay-based Technologies for Increasing Farmyard Poultry Production in Africa" held from 4 to 8 September 2000 in Morogoro, Tanzania.

Report on the Workshop on strategic planning of area-wide tsetse and trypanosomiasis control in West Africa held from 21-24 May 2001 in Ouagadougou, Burkina Faso.
http://www.iaea.org/programmes/nafa/d3/public/bfaso.pdf

Development and field evaluation of animal feed supplementation packages, IAEA-TECDOC-1294

In Press:

External Quality Assurance Programme for the FAO/IAEA/P4-24 Exercise, for the determination of progesterone in skim milk and plasma of farm livestock, Report (EQAP/November 2000). M. Khadra, O. Perera.

External Quality Assurance Programme for the FAO/IAEA/P4-23 Exercise, for the determination of progesterone in skim milk and plasma of farm livestock, Report (EQAP/August 2000). M. Khadra, O. Perera.

In Preparation:

A Joint FAO/IAEA TECDOC on 'Quantification of tannins in tree foliage'. The Working Manual is already available on the Website:

http://www.iaea.org/programmes/nafa/d3/crp/pubd31022manual-tannin.pdf

The Establishment of Quality Systems in Agriculture Laboratories in Developing Countries, IAEA Centered Issue for the Journal 'Accreditation and Quality Assurance - ACQUAL'

Proceedings of the third RCM of the Co-ordinated Research Project on "The Rinderpest Sero-monitoring and Surveillance in Africa Using Immunoassay Technologies" held from 16 to 20 October 2000 in Vienna, Austria.

Proceedings of the third RCM of the CRP entitled "Diagnosis and Control of Contagious Bovine Pleuropneumonia (CBPP) in Afrca" held from 18 to 22 June 2001 in Nairobi, Kenya.

The manuals describing the use of Charting methods as aids to Internal Quality Control in Indirect and Competitive ELISAs will be produced as IAEA-TECDOCs.

A guidebook dealing with practical aspects of PCR technologies as applied in the veterinary sphere, is being prepared by Professor Gerrit Viljoen, DSc. Head: Applied Biotechnology Division, Onderstepoort Veterinary Institute, South Africa, and colleagues. The manuscript is now being edited and should be available by the end of 2002.

CD-ROMs

A CD Rom is available dealing with training material for the diagnosis of rinderpest and for the preparation for the OIE pathway. It was produced under an IAEA Technical Co-operation project RAF/0/013 "ICT based training to strengthen LDC capacity". Contact J. Crowther (J.Crowther@iaea.org) for further information.

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J. WEBSITES

- The web page of the Section is being updated on a regular basis. Please feel free to look at the web pages and make comments.
  http://www.iaea.org/programmes/nafa/d3/index.html
- Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture Homepage:
  http://www.iaea.org/programmes/nafa/
- FAO Homepage: http://www.fao.org/
- FAO/IAEA Guidelines for Establishing Quality Systems in Veterinary Diagnostic Testing Laboratories
  http://www.iaea.org/programmes/nafa/d3/public/guidelines.pdf
- Web-based interactive programme about ISO/IEC 17025
  http://www.aplactraining.asn.au
- International Symposium on Application of Gene-Based Technologies for Improving Animal Production and Health in Developing Countries, 6–10 October 2003,Vienna, Austria.
  http://www.iaea.org/programmes/nafa/d3/index-symp2003.html
- It is hoped to start a web page designed to deal with test validation. It is envisaged that the site will be interactive in some sections allowing data to be examined and discussed, as well as presenting validation data for kits as supplied, as well as allowing continuous data on the field performance of the kits to be examined. Validation data of tests involving rinderpest, PPR, FMDV, CBPP, ASF, trypanosomosis, brucella and NDV will be considered. It is hoped that this will lead to better quality of kits and reagent sets and help define the state of play on a more continuous basis.

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