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



Small-holder dairy farmer in the North-West of Cameroon

Contents

- To Our Readers 1
- Staff 3
- Forthcoming Events 4
- Past Events 5
- Status of Existing Coordinated Research Projects 10
- New Coordinated Research Projects 11
- Technical Cooperation Projects 12
- Activities of the Animal Production Unit at the FAO/IAEA Agriculture and Biotechnology Laboratory 13
- Publications 14
- Websites 15

To Our Readers

Once again the year is rushing by and already we have entered into the second half of 2004. The first phase of this year has been a busy time for all personnel in the sub-programme. Apart from our regular Coordinated Research Project (CRP) activities and our technical support given to national and regional Technical Cooperation (TC) projects, we were involved in the technical evaluation of applications for new TC projects by Member States for the 2005/2006 biennial project cycle. We were also occupied with preparing the IAEA's 2006/2007 Work and Budget Programme. It is hoped that our inputs will serve the best interests of our Member States.

As with previous newsletters, I will introduce a topic to hopefully stimulate discussion and debate and encourage interactions between all. The subject for consideration is molecular diagnostics and likely future trends. It is well known that nucleic acid based-technologies are making considerable contributions to the diagnostic field. PCR-based assays are already being utilized routinely by many laboratories and on-going developments are refining as well as expanding their capabilities. In fact, the first PCR diagnostic reference laboratory was approved by the OIE recently.



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The use of real-time PCR and automated sample processing devices have already made significant contributions in reducing contamination whilst improving test consistency, rapidity, sensitivity and throughput. Improving the sensitivity of detection might also obviate the need to perform amplification reactions and the requirement to design suitable primers to amplify the target sequence. Several alternative target, probe and signal amplification systems have been described (ligase chain reaction, strand displacement amplification and others). In addition, technologies to enhance separation and detection of nucleic acids have been developed (capillary electrophoresis, mass spectrometry). Labelling and detection methods other than radioactivity are also making important contributions (enzymatic, fluorescence, chemiluminescence, and nanoparticle labelling). Commercial kits for the molecular detection of the most important pathogens are becoming increasingly available. Nevertheless, conventional microbiological assays should be maintained to validate and guide further developments with the newer diagnostic approaches. There is also a need to standardise nucleic acid assays through ring tests and proficiency testing and to establish suitable guidelines and quality control programmes. The availability of lyophilized standards will assist in this process. The need for suitably trained staff to perform and evaluate nucleic acid-based assays, as well as the costs associated with many associated technological platforms is also an important requirement and in some cases an obstacle for their wider application. There is a need for centralized facilities to perform such tests but developments in integrated systems are likely to allow for future point-of-care testing. Rapid developments in biosensors are producing more effective biological recognition molecules as well as transducers. Many of these have the potential of generating signals following the detection of single molecules. Microarray technologies have the potential of testing in parallel large numbers of pathogens simultaneously, and this can have significant contributions to the diagnostic capabilities of many laboratories. Developments on the integration of sample processing, amplification and analysis and the eventual production of effective commercial testing devices would herald an important achievement in allowing for point-of-care testing. Advances in nanotechnology have potentially important contributions to make in this process, with the likelihood that test results could be obtained within minutes. Suitable wireless communication systems with centralized data banks as well as access to decision making tools will allow for speedy therapeutic and prophylactic decision making, a desirable achievement in any effective diagnostics programme. Please send us your comments.

Looking back at the activities of the past six months, we had several workshops, training courses, research coordi-

nation meetings (RCMs) and consultants meetings. Activities scheduled for the next half-year include project review meetings, RCMs, inter-regional training courses and regional workshops. Both past and future activities are discussed in further detail in this newsletter and are also accessible at the AP&H Section website. Let us know if you have any ideas, comments, concerns or questions. We thank all those who have responded to our request to update their contact and mailing address details and urge those who haven't to please do so by replying to R.Schellander@iaea.org. This will ensure that the next copy of our newsletter will be received. By also sending us the addresses of unsubscribed colleagues we will be able to widen our network. As discussed in previous newsletters, the Animal Production and Health sub-programme will continue to move progressively forward and in pace with developments within the livestock field so as to optimally serve our Member States. We will therefore continue to encourage project teams to keep abreast of current technological developments and to promote their implementation where feasible. This would allow a better positioning of our Member States with respect to international trade and other livestock-related issues. In turn, this would promote improved quality assurance of animal husbandry and health practices, and also lead to a greater autonomy for Member States.

Finally, in our news from the sub-programme, we want to wish Victor Mlambo, who was with us for one year as an Agency funded Junior Professional Officer, best of luck on his return to Zimbabwe. Victor was at the sub-programme's Seibersdorf Animal Production Unit laboratory, validating tannin determination assays in food and feed. Congratulations also to Eva Winger for obtaining the G6 technical assistant position at the same laboratory. We will be announcing a position to enhance our efforts in animal health and quality management activities shortly.

Mention should also be made of a special achievement by one of our staff members, John Crowther, who will attend a meeting in Dublin on 11 June 2004 that is being held to celebrate the 50th Anniversary (1954–2004) of the European Commission for the Control of Foot-and-Mouth Disease (EUFMD). John has been nominated by the veterinary services of Member States and experts from veterinary laboratories as someone whose contribution to the work of the commission and to FMD control in Europe is outstanding.



Gerrit Viljoen,
Head, Animal Production and Health Section

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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.

Forthcoming Events

Third RCM on 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

This meeting will be held in the Philippines from 5 to 9 July 2004. Final reports on comparative work under the CRP will be given and conclusions about the use of kits from various commercial sources will be made. A TECDOC will be published by the end of 2004.

Training Course on Brucellosis (RER/5/012)

Technical Officer: John Crowther

Under IAEA TC Project: regional control of brucellosis in sheep and goats (RER/5/012) a training course will take place at the Faculty of Veterinary Medicine, Skopje, Macedonia, from 20 to 25 September 2004.

The programme is designed to train scientists in the methodology available to enable diagnosis of brucellosis, especially in sheep and goats. The focus will be on screening testing using Indirect Enzyme Immunosorbent Assay (I-ELISA), on milk/pooled samples and confirmatory tests using Indirect and Competitive ELISAs, (I-ELISA and C-ELISA) on individual samples of sera and milk. Molecular techniques involving the use of Polymerase Chain Reaction (PCR) will be demonstrated for pathogen detection. Theoretical and practical aspects of these tests, as well as comparison to more conventional tests, will be covered in lectures and practicals. The relevance of testing to control programmes will be covered.

At the end of course participants should be able to:

- Screen and confirm the presence of antibodies against brucella in serum and milk
- Detect evidence of pathogen in biological material
- Understand the importance of national informative systems for the control of brucellosis
- Understand the need and design of national brucellosis control programmes
- Understand national and international regulations for brucellosis control.

The training course is for experienced scientist and veterinarians directly involved in brucellosis control and with experience in laboratory techniques (ELISA and maybe in PCR). Participants must have basic training and experience in laboratory techniques, safety and good understanding fundamentals of immunoenzymatic and molecular methods. Participants will be supplied with the

local field samples for training, but will be encouraged to supply five negative, five positive and five doubtful serum/milk field samples from small or large ruminants from their country subject to International rules of movement of biological materials.

Final Project Review Meeting of the AFRA Project: Improving and Increasing Milk and Meat Production (RAF/5/046)

Technical Officer: Oswin Perera

The meeting will be held in Ougadougou, Burkina Faso, from 4 to 8 October 2004. National project coordinators from 12 AFRA Member states participating in the project will be invited to participate. The meeting will review the work done and results obtained during the full six year period of the project, including training activities conducted, cost benefit analyses and impact assessment. The papers presented will be edited and published as an Agency TECDOC.

Training Course on FDM Serology (RAS/5/041)

Technical Officer: John Crowther

A two-week training course on the serological and molecular diagnosis of FMD will be held in Pakchong, Thailand, from 11 to 22 October 2004 under the regional project RAS/5/041. Participants will be invited from the countries involved through the IAEA representatives. Further details including a prospectus and information on the procedure for nominations will be circulated to RAS.

Workshop on Food Safety Requirements for the International Market: Strategies for Residues Programmes

This workshop will be held in Chile, from 18 to 22 October 2004 and is open to senior government and public health officials from Member Countries of FAO or IAEA in Central and South America and the Caribbean. Participants should be involved at policy-making level in the field of public health, agriculture or international trade in animal-derived food products. Funding is available for only one participant from each country. Further details and nomination forms will be circulated through official channels. The deadline for nominations is 1 August 2004. Nominations should be submitted through the FAO representative, FAO National Committee or National Atomic Energy Authority. The workshop will be conducted in Spanish.

Final RCM to Develop and Validate Standardized Methods for Using Polymerase Chain Reaction (PCR) and Related Molecular Technologies for Rapid and Improved Animal Disease Diagnosis (D3 20.17)

Technical Officer: John Crowther

This RCM will be held in Vienna, Austria, in October 2004 and will bring together all the research and developmental work made under the CRP. Full reports of the work carried out under this project will be made as well as a set of working protocols based on the experience of the Contract holders. This will be published as a TECDOC in 2004. It is hoped that a manual for PCR can be

finalized at the meeting to act as a working guide for setting up and using PCR in developing countries.

Final Project Review Meeting for the RCA Project: Improving Animal productivity and Reproductive Efficiency (RAS/5/035)

Technical Officer: Harinder Makkar

The meeting will be held in Khon Kaen, Thailand in October 2004. National Project Coordinators from 12 RCA countries participating in RAS/5/035 are likely to participate. The work done including the training activities conducted, and their impact at the level of end users will be evaluated and the results will be collated for publication as an Agency TECDOC.

Past Events

Introductory Training Course on Screening and Confirmatory Methodologies for Veterinary Drug Residues

Technical Officer: Andrew Cannavan

This training course took place from 10 to 21 November 2003 at Onderstepoort Veterinary Institute (OVI), South Africa as part of the FAO Project "Strengthening Capacities for Implementation of Codex Standards, Guidelines and the Recommended International Codes of Practice for Control of the Use of Veterinary Drugs" (PFL/INT/858/PFL).

This was the second technical training course to be held under this project, the first being at Seibersdorf, Austria, in June 2003. The objectives of the course were:

- to provide an overview of the methodologies employed in veterinary drug residues analysis,
- to give practical demonstrations and hands-on experience of the most commonly used techniques,
- to provide information on aspects such as method validation and troubleshooting,
- to provide instruction on the application of the most recent guidelines and legislation regarding residues analysis,
- to discuss and address specific issues and problems of importance to the participants.
- to provide information on mechanisms such as IAEA Technical Cooperation Projects (TCP) and Coordinated Research Projects through which Member States may obtain further assistance in the field of veterinary drug residues.

The course programme comprised a blend of lectures, laboratory practical sessions and demonstrations, computer based practical exercises and discussion sessions.

Emphasis was placed on the screening and quantitative methods likely to be applicable in developing. The material was presented by the Technical Officer, a team of international consultants and staff of OVI.

Eighteen candidates, mainly from Africa, participated in the course. The number of participants was limited mainly by the laboratory facilities and supervisory personnel available for practical work. The trainees were divided into groups for the practical sessions and all group members were encouraged to participate and gain "hands-on" experience in the various activities. Handouts and supplementary material were provided for each lecture and each participant received a CD containing all MS Powerpoint presentations and other materials used during the course.

The performance of the participants was assessed continuously through close interpersonal interaction between the TO, course presenters and participants and appraisal of the results of practical work. Feedback was invited during and after the course.

Feedback from the course was very positive. It was generally felt that the lectures covered all of the most important topics, the material was well presented and the knowledge acquired by the trainees would improve their competence as analysts. Comments from several participants indicated that the training period was too short. It was thought that an extended period would permit more hands-on practical work, including advanced techniques such as HPLC and mass spectrometry, which would be beneficial. However, this would be difficult to implement in a course such as this which is held in a working laboratory because of the disruption caused to the routine work of the laboratory and the lack of laboratory space, instrumentation and supervision for such a large number of trainees. Several participants thought that further training should be provided, both through courses similar to this

one and through individual attachment to working laboratories. Such training is currently provided to some degree through Fellowships awarded under IAEA Technical Cooperation Projects. It was felt by several participants that the subject of sampling and the practical aspects of sample reception, security and traceability were not covered in sufficient detail. As with the first presentation of the course, it was felt that some of the most useful aspects of the course were those dealing with practical applications and troubleshooting.

Conclusions and recommendations

The conclusions and recommendations generated were largely the same as those formulated at the first presentation of the course at Seibersdorf in June 2003 and are summarized below:

The participants considered that the knowledge gained on this course would improve their competence as analysts in field of veterinary drug residues and would be of benefit to the residues programmes in their respective countries.

Overall, it was felt that the balance of topics was appropriate.

It was agreed that the lecturers presented the course material effectively and also possessed all the specialist knowledge necessary to address points raised by the trainees during lectures or in open discussion. This latter point was felt to be extremely important.

The working relationships and networks formed between participants from both developed and developing countries is a very important aspect of this type of activity. It was recommended that the IAEA and other international bodies should investigate ways to further promote cooperation between laboratories/institutes working in the residues field or instigating residues programmes.

The course is suitable, with minor amendments, for presentation in the East Asia/Pacific region. The discussion sessions included in the programme should permit specific regional or national issues to be addressed.

There is a need for courses such as this to act not only as an introduction to the techniques but to update the knowledge of scientists in developing countries with regard to methodologies and associated legislation and guidelines. Other funding mechanisms should be investigated to enable such courses or workshops to be held after the current FAO funded project is completed.

There is also a need for follow-up courses with a narrower focus and more scope for practical work, for example on screening methodologies, HPLC methods, sample preparation, mass spectrometric techniques.

Acknowledgements

The Technical Officer wishes to express his gratitude to Ms. Azel Swemmer, the local organizer for the course,

and to the staff of the Residues Laboratory, OVI, for their technical assistance and preparative work for the course.

Consultants Meeting on OIE Validation and Certification of Diagnostic Assays for Infectious Animal Disease

Technical Officer: Adama Diallo

Up to now, the Office International des Epizooties (OIE), has classified animal diagnostic tests into prescribed or alternative tests for international trade purposes. If the purpose of the diagnostic test falls outside this definition, there is no clear indication on the requirements for a dossier to be submitted to the OIE. The Joint FAO/IAEA Division convened a consultant meeting in November 2002 to discuss the assay validation process and the procedures needed to guide the certification of animal disease diagnostic tests by the OIE. A recommendation of that meeting was adopted by the OIE at its General Session in May 2003 in a resolution which indicates clearly the adoption of the 'fitness for purpose' in the process of test validation. Following this resolution of the OIE, a second consultants meeting, held in Vienna from 9 to 12 December 2003, was convened by FAO/IAEA and OIE to produce a template and some guidelines that will underwrite the development of an assay validation dossier for submission to the OIE. The use of assays validated according to fitness for purpose will give more confidence in animal disease management and in the trade of animals and animal products. Participating experts at this meeting were from international organizations, public institutions, and private companies. The outputs of the meeting are as follows:

- A template for the collection of test validation data to be submitted to the OIE was established.
- A guideline for assay registration by the OIE was written. Assays to be reviewed would primarily concern the OIE list A/B diseases. For other diseases, consideration of the assay for registration are at the discretion of the OIE Biological Standards Commission. The dossier will be analyzed by a review panel on a time bound basis.
- A guideline was established for the production of reference standards reagent panels to be used to standardize the analytical sensitivity specificity and performance of different assays and assay performance in different laboratories.

All conclusions of the meeting were sent to the Director General of the OIE for consideration.

Task Force Meeting to Review Results from Cost Benefit Analyses and Regional Supply of Progesterone Tracer, and Finalize Cost-Recovery Strategy (RAF/5/046)

Technical Officer: Oswin Perera.

This meeting was held from 1 to 5 March 2004 in Pretoria, South Africa. It was attended by five Project Coordinators from the participating AFRA Member States (MSs), who were selected on the basis of their annual progress report for 2003 (from Algeria, Burkina Faso, Ethiopia, Uganda and Zambia), together with the Project Scientific Consultant (PSC; PC for Tunisia), the PC for South Africa, and the representative of the Nuclear Energy Corporation of South Africa



(NECSA) who is responsible for producing ^{125}I progesterone tracer. It was supported by an IAEA expert, Dr. P. Anandajayasekaram, and the Technical Officer.

The objectives of the meeting were to:

- review results from cost-benefit analyses done by each country and finalize the strategy for future cost-recovery;
- review results obtained from RIA conducted using regionally produced tracer, discuss any problems encountered in technical or logistical aspects and recommend solutions; and
- determine future needs for a regional project to further advance cattle production and draft a project framework.

The main recommendations were:

- Progesterone RIA should be integrated into AI programmes of MSs and a cost-effective N-PD service should form a component of a multifaceted service package provided to farmers for improving cattle productivity.
- NECSA and MSs should together explore means to ensure that tracer reaches all end users in a timely and cost effective manner.
- NECSA should continue to explore procedures for overcoming the variations in activity and evaporation that has occurred during transit.
- All MSs should ensure that monitoring and evaluation becomes an integral part of project planning and implementation.
- National strategy should be developed to ensure continued and sustainable delivery of the N-PD service (including upgrading of laboratories) beyond the life of the AFRA project.

- In-service training of livestock professionals, AI technicians and extension staff should be provided on a continuing and sustainable basis.
- Commercial or economic viability of all service activities should be assessed and documented.
- A regional laboratory should be identified and supported to undertake external quality assurance (EQA) for the progesterone RIA.

The final project review meeting should be held in Burkina Faso from 4 to 8 October 2004.

A comprehensive report should be prepared by each PC in accordance with the format and guidelines developed during this meeting and submitted to the IAEA and the PSC by 15 August 2004.

The proposal for a new project which was developed during this meeting should be supported by AFRA and IAEA, in order to assist farmers to fully utilize the improved offspring resulting from better AI services and reproductive management of cattle.

Copies of a CD-ROM containing electronic files of the meeting report, reports and presentations of PCs, lecture notes, presentations and handouts of the expert, presentations and handouts of the TO and photographs of the meeting and field visits have been provided to all PCs of RAF/5/046. A full report on the meeting is available in the AP&H Section and the office of the AFRA Projects Coordinator. We thank Taurus Stock Improvement Co-operative and NECSA for hosting this meeting.

Training Course on Screening and Confirmatory Methodologies for Veterinary Drug Residues

Technical Officer: Andrew Cannavan

This, the third presentation of this training course, took place from 15 to 26 March 2004 at the Werribee Centre of Primary Industries Research Victoria (PIRVic), Australia. The course was designed to give an overview of the theoretical and practical aspects of the main methodologies used in veterinary drug residue laboratories and to introduce the participants to issues such as the relevant guidelines and legislation, laboratory quality assurance, method validation and troubleshooting. Seventeen scientists, mainly from South East Asia and The Pacific, participated. The participating scientists were generally of a high standard and this was reflected in their interest in the subject matter and participation in the programme.

The Technical Officer is grateful to Dr. Craig Trennery and Ms. Debra Gill, the local organizers, and the staff of PIRVic for their collaboration and assistance in running this course.

Workshop for Trainers on Cattle Fertility Management for Optimum Economic Returns (RAS/5/035)

Technical Officer: Oswin Perera

This workshop was held from 26 to 30 April 2004 in Ludhiana, India. It was hosted by the Punjab Agricultural University (PAU), with the assistance of the Department of Atomic Energy (DAE), Government of India. It was held at the Veterinary College of PAU and was attended by all 18 selected participants (from Bangladesh, India, Indonesia, Malaysia, Mongolia, Myanmar, People's Republic of China, Republic of Korea, Sri Lanka, Thailand and Vietnam). The Course Director was Prof. Amarjit Singh Nanda and the external resource persons were Prof. Adithya Misra (G.B. Pant University, Pantnagar, India) and the Technical Officer. Lectures and demonstrations were also given by six local resource persons from the host institute.

The objective of the workshop was to improve the knowledge and skills of national specialists who are involved in the training of field veterinarians, AI technicians, extension workers and livestock farmers. The training was focused on the following aspects: (a) management of breeding bulls, semen technology and delivery of AI services; (b) clinical and hormonal investigations, therapy and preventive measures; (c) recording, management and reporting of farm and AI data; and (d) continuing education programmes for technicians, extension workers and farmers. The course was organized in the form of lectures, demonstrations, hands-on practical work on cattle and buffaloes, discussions, field visits and presentations by participants.

Practical work included examination of breeding bulls and cows. Demonstrations were done on semen technology and associated AI procedures, processing of milk samples for RIA and computerised management of field and laboratory data. Each participant made a presentation on the current procedures for recording, analysing and reporting of AI data in his/her country.



A compendium containing all lectures and background reference materials was prepared before the course and provided to participants. A CD-ROM containing electronic versions of technical documents related to the course (compendium, PowerPoint presentations and handouts of lecturers, presentations of participants, and photographs taken during practical work and field visits) was prepared after the course and sent to all participants, resource persons and national Project Coordinators of

RAS/5/035. Copies of the CD-ROM are available with the Animal Production and Health Section, NAFA and the RCA Coordinator's Office, TCPA.

FAO/IAEA Planning Meeting and Inter-regional Training Workshop on Molecular Methods for the Quantitation of Rumen Microorganisms

Technical Officer: Harinder Makkar

The planning meeting and training workshop were held from 19 to 30 April at the CSIRO Livestock Industries, Queensland BioSciences Precinct, St Lucia, Brisbane. First three days (19–30 April) were devoted to the planning meeting. The objectives of the meeting were to acquaint the Research Contract and Agreement holders of the work being conducted by the participants and the resources in terms of staff, laboratory equipment and funds available with them, and plan future studies. Fourteen Research Contract, Research Agreement and Technical Contract holders and the Scientific Secretary attended the meeting. Detailed work plans for all the groups were prepared for the first year.



The training workshop was organized from 22 to 30 April. Nine Research Contract holders attended the training workshop. The programme of the training workshop consisted of lectures and practical exercises on:

- Conventional anaerobic microbiology techniques
- Culturing techniques for methanogens
- PCR based molecular ecology techniques
- Quantitation of rumen populations by real time PCR
- Measurement of methane from animals and cultures

Further information on the project can be obtained from the AP&H Section website

Third FAO/IAEA Molecular Diagnostic and PCR Training Course

The training course took place from 3 to 28 May 2004 at the Council for Scientific and Industrial Research (CSIR), University of Pretoria (UP) and Onderstepoort Veterinary Institute (OVI) campuses, Pretoria, South Africa. The course is designed to transfer molecular diagnostic approaches and techniques to developing country diagnosticians to enable them to improve their skills, laboratory capabilities and control strategies. The course curriculum included an overview of the methods used in molecular diagnostic analysis with theoretical lectures and practical demonstrations and hands-on experience of appropriate techniques, instruction on the application of

relevant guidelines and quality assurance systems (ISO 17025 and FAO/IAEA quality standards and guidelines), molecular diagnostic laboratory accreditation, control strategies and related legislation topics and to address specific issues of importance to the participants. The trainees showed a keen interest in the subject matter and participated fully in the programme and in both formal and informal discussion sessions. The next course is scheduled for May 2005. More information is given on the AP&H Section website.

Strategic Global Research Partnership for FMD Control

J.R. Crowther attended an inaugural collaborators meeting for the strategic global research partnership for foot and mouth disease control entitled towards the progressive global control of foot-and-mouth disease (FMD) and the safeguarding of FMD-free countries and zones: the development and evaluation of improved and new FMD control technologies, which took place at the United States Department of Agriculture (USDA), Washington on 29 and 30 May 2004.

The meeting proposed a global research partnership initiative centering on specific laboratories with responsibilities for specific pillars of science where research was needed to allow better vaccines and therapeutics for FMD. These were: the Pirbright Laboratory of the Institute for Animal Health, UK (Coordinator of the Immune Responses Pillar); the Plum Island Laboratories of the US Department of Homeland Security/US Department of Agriculture (USDA), Agriculture Research Service (ARS)/Animal and Plant Health Inspection Service (APHIS), Greenport, New York, USA (Coordinator of the Anti-Viral Agents Pillar); the Australian Animal Health Laboratory (AAHL), Geelong, Victoria, Australia (Coordinator of the Vaccines Pillar); the National Center for Foreign Animal Disease Laboratory, Winnipeg, Canada (Coordinator of the Persistent Infection Pillar); the International Livestock Research Institute (ILRI), Nairobi, Kenya (Coordinator of the Technology Performance Evaluation Pillar). Presentations were made on Thursday dealing with each of the pillars of science, as well as the possible management structure, accountability and extension of the research envisaged into other institutions. The observers and donors were asked to convene a private meeting on the morning of Friday to provide comments, criticisms and help in modifying the proposals and obtaining funding based on the information presented. There was consensus that the initiative was timely and that the areas of research science were highly relevant. The questions posed by the observers were then answered by the consortium representatives and there followed a wide ranging discussion on the way forward with regard the science and funding opportunities. A full report of the meeting will be published in hard copy and on the web.

Final Research Coordination Meeting of the Coordinated Research Project on Assessment of the Effectiveness of Vaccination Strategies Against Newcastle Disease and Gumboro Disease Using Immunoassay-based Technologies for Increasing Farmyard Poultry Production in Africa (D3.20.19)

Technical Officer: Gerrit Viljoen

The final Research Coordination Meeting of the FAO/IAEA Coordinated Research Project (CRP) on "Assessment of the effectiveness of vaccination strategies against Newcastle Disease and Gumboro Disease using



immunoassay-based technologies for increasing farmyard poultry production in was be held from 24 to 28 May 2004 in Vienna, Austria. This CRP looked at the impact of different interventions such as vaccination, improved housing, feed supplements and antiparasitic treatment on the economics of poultry production in Africa. It is anticipated that the results of this CRP will help poultry producers at the village level to increase the productivity of backyard poultry flocks.

immunoassay-based technologies for increasing farmyard poultry production in Africa. It is anticipated that the results of this CRP will help poultry producers at the village level to increase the productivity of backyard poultry flocks.

Final RCM on Use of Nuclear Techniques to Develop Simple Tannin Assays for Predicting and Improving the Safety and Efficiency of Tanniniferous Forage (D3.10.22)

Technical Officer: Harinder Makkar

This meeting was held from 7 to 11 June 2004 in Kars, Turkey.

Eleven Research Contract, Agreement and Technical Research holders participated in the meeting. The objective of the meeting was to evaluate the work conducted in the second phase of the project in which the main aim was to develop strategies for detanninification of tree and shrub leaves and to use the promising ones to enhance the nutrient availability from these feed resources. A compilation of results obtained by the groups in this network programme has been produced in the meeting. The results from this programme will be published in a special issue of the Animal Feed Science and Technology journal, which is likely to be published in early 2005.

The conclusions and recommendations from this RCM are available at the AP&H Section website.

FAO/IAEA Inter-regional Training Course on Molecular Methods in Animal Genetics and Breeding

Technical Officers: Oswin Perera and Fernando Garcia

This training course was held from 14 to 25 June 2004 at the FAO/IAEA Agriculture and Biotechnology Laboratory in Seibersdorf, Austria. Sixteen participants from Member States of FAO and IAEA and attended. The objective of the course was to enhance knowledge and practical training on current molecular marker techniques and experimental design in livestock genetic resources characterization in order to obtain information that can be used to develop breeding strategies aimed at maximizing

the utilization of indigenous breeds in developing countries. The course included lectures, practical exercises and discussions on the following topics: molecular biology theory, sampling procedures, DNA extraction and purification, polymerase chain reaction (PCR), DNA microsatellite analysis using different electrophoresis systems, DNA sequencing and applications of DNA markers (marker-assisted selection – MAS, marker assisted conservation – MAC, functional genomics, parentage testing, linkage analysis, genetic mapping principles and related computer software utilization) to improve the use of these techniques in developing countries.

A full report will be included in the next newsletter.

Status of Existing Coordinated Research Projects

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

Technical Officer: Harinder Makkar

This CRP has concluded with the final RCM held in Kars, Turkey in June 2004. For additional information, refer to the previous section

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

Technical Officer: Oswin Perera

This CRP is now in its third year and has a full complement of participants, comprising ten Research Contracts, one Technical Contract and four Research Agreements. The second RCM was held from 21 to 25 July 2003 in Asunción, Paraguay. The third RCM is scheduled from 14 to 18 March 2005 in South Africa and the final RCM will be held towards the end of 2006 in Asia.

Development and Use of Rumen Molecular Techniques for Predicting and Enhancing Productivity (D3.10.24)

Technical Officer: Harinder Makkar

The planning meeting and training workshop were held from 19 to 30 April at the CSIRO Livestock Industries, Queensland BioSciences Precinct, St Lucia, Brisbane. First three days (19–21 April) were devoted to the planning meeting. Fourteen Research Contract, Agreement and Technical Contract holders, and the Scientific Secretary participated in the meeting. The work plan for all Research Contract holders (RCH) were developed. Dur-

ing the first year, the emphasis of the activities will be on the introduction of the PCR based molecular tools and methane measurement *in vitro* in the laboratories of the RCH and on the quality control of the data generated. The training workshop was organized from 22 to 30 April in which nine RCH were imparted training on PCR based methodologies for quantification of rumen microbes. For additional information, refer to the previous section.

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

Technical Officer: John Crowther

The final RCM will provide the data to produce a TECDOC as well as to finalize a manual for PCR development and use in developing countries based on the experiences over the past five years by the counterparts.

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

Technical Officer: Gerrit Viljoen

The final RCM of this CRP was held in Bamako, Mali from 17 to 21 February 2003. The proceedings will be published in 2004/5.

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: Gerrit Viljoen

There are currently twelve Research Contracts and five Research Agreements. The Final RCM took place from 24 to 28 May 2004 in Vienna. The proceeding will be published in 2004/5

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

New kits from CEDI diagnostics have been distributed for comparison to other tests. The standard sera against FMD types SAT 1, 2 and 3 are now made and will be characterized before and after eradication. A competitive ELISA based on work in the Geelong laboratory under a Technical Contact, using chicken antisera raised against FMD NSP 3ABC, is now available for testing. This will be distributed in the final phase of the CRP. Most contracts have been renewed. Most Research Contracts have been renewed.

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

Technical Officer: John Crowther

Gene-based Technologies in Livestock Breeding: Phase 1 Characterization of Small Ruminant Genetic Resources in Asia

Technical Officer: Oswin Perera

The announcement and call for proposals for this CRP was published in the June 2003 issue of the newsletter. This information is also available at the AP&H Sec-

Good progress has been made in analyzing the universal primers. A full report of the second RCM is available. Most Research Contract holders have renewed their contracts.

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

The second RCM for this project was held in Pretoria South Africa, from 3 to 7 November 2003. The CRP involves a full complement of 12 Research Contract holders, three Research Agreement holders and two Technical Contract holders.

African Swine Fever Technical Contract 11294 (D3.00.00)

Technical Officer: John Crowther

Indirect ELISA kits are still available from the Institut Sénégalais de Recherches Agricoles ISRA, Laboratoire National de l'Élevage et de Recherches Vétérinaires (LNERV), for the detection of antibodies against ASF. Each kit includes plates, tips and reagents for testing 2800 samples and costs US\$ 2000. Applications for kits should be made to the Senegal laboratory directly (Dr. Joseph Sarr; Josarr@refer.sn).

New Coordinated Research Projects

Gene-based Technologies in Livestock Breeding: Phase 1 Characterization of Small Ruminant Genetic Resources in Asia

Technical Officer: Oswin Perera

The announcement and call for proposals for this CRP was published in the June 2003 issue of the newsletter. This information is also available at the AP&H Sec-

tion website and includes details on the rationale, background, objectives, expected outputs, and implementation procedure. The closing date for submission of proposals was 31 March 2004 and over 60 proposals have been received. Selection of proposals for award of contracts is expected to be done in the second half of 2004.

General information applicable to all Coordinated 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 URL <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 Technical Cooperation (TC) Projects. Such support is available to IAEA Member States and can include additional support such as equipment, specialized training through IAEA training fellowships and the provision of technical assistance through visits by IAEA experts for periods of up to one month. Full details of the TC Programme and information on how to prepare a project proposal are available at the URL <http://www-tc.iaea.org/tcweb/default.as>

Technical Cooperation Projects

Operational Projects in 2003/2004 and Technical Officers responsible for implementation

ANG5002, Upgrading Laboratory Services for Diagnosis of Animal Diseases, John Crowther and Gerrit Viljoen

BEN5002, Diagnosis and Control of Animal Diseases, John Crowther

BGD5023, Development of Agroforestry-Based Livestock Production Systems, Harinder Makkar

BKF5002, Development of a Veterinary Medicine to Combat the Fowl Pox Virus, Gerrit Viljoen

BOL5014, Differential Diagnosis of Foot and Mouth Disease, John Crowther

CMR5011, Nuclear Techniques for Improving Local Ruminant Productivity, Harinder Makkar and Oswin Perera

CMR5012, Diagnosis and Surveillance of Major Animal Diseases Using Molecular Biology Techniques, John Crowther and Gerrit Viljoen

COL5020, Use of Protein Banks for Improving Pork Production, Harinder Makkar

CPR5014, Increasing the Productivity of Crop/Livestock Production System, Harinder Makkar

CYP5019, Accreditation of Laboratory for Control of Foods of Animal Origin, Andrew Cannavan

ELS5009, Improving Cattle Production and QC for Monitoring of Animal Diseases, Oswin Perera

ETH5012, Integrating Sterile Insect Technique for Tsetse Eradication, Gerrit Viljoen and Udo Feldmann

INS5029, Supplementary Feeding and Reproduction Management of Cattle, Oswin Perera and Harinder Makkar

INS5032, Improving Beef and Dairy Cattle Production in Yogyakarta, Oswin Perera and Harinder Makkar

INT5148, Establishing Quality Systems in Veterinary Testing Laboratories, John Crowther

IRA/5/012 Preparation of ELISA Kits for Diagnosis of Foot and Mouth Disease, John Crowther

MAG5012, Increasing Self-sufficiency in Domestic Meat and Milk Production, Harinder Makkar

MAL5025, Food Safety Monitoring Programme for Livestock Products, Andrew Cannavan

MAT5003, Surveillance Programmes for Contaminants in Foods of Animal Origin, Andrew Cannavan

MEX5026, Improving the Reproductive Performance of Pelibuey Sheep in Tropical Mexico Using Local Feed Resources, Harinder Makkar

MON5012, Monitoring of Residues in Livestock Products and Surveillance of Animal Diseases, Andrew Cannavan

MYA5011, Development of Supplementary Feeding Strategies Based on Local Feed Sources, Harinder Makkar

MYA5012, Diagnosis and Control of Swine Vesicular Disease and Swine Brucellosis, John Crowther

NAM5007, Control of Animal Diseases in Northern Namibia, Gerrit Viljoen

NIR5032, Control and Eradication of African Swine Fever, John Crowther

PAK0007, Human Resource Development and Nuclear Technology Support, Oswin Perera

PAK5041, Setting Up Immunoassay and Molecular-Based Methods to Monitor and Survey Rinderpest Disease, John Crowther

POL5010, Increasing Pig Productivity Through Radio-immunoassay to Determine Methods for Advancing Puberty in Gilts, Oswin Perera

RAF0013, ICT-Based Training to Strengthen LDC Capacity, John Crowther and Oswin Perera

RAF5046, Increasing and Improving Milk and Meat Production (AFRA III-2), Oswin Perera

RAF5053, Assistance to OAU/IBAR PACE Programme for the Control and Eradication of Major Diseases Affecting Livestock, Gerrit Viljoen, Mamadou Lelenta

RAS5035, Improving Animal Productivity and Reproductive Efficiency (RCA), Oswin Perera and Harinder Makkar

RAS5041, Production of Foot and Mouth Disease Antigen and Antibody ELISA Reagent Kit (RCA), John Crowther

RER5012, Regional Control of Brucellosis in Sheep and Goats, John Crowther

SAF7002, Development of Veterinary Vaccines and Strengthening Drug Residue Laboratory Capabilities, John Crowther

SIL5006, Improving the Productivity of N'dama Cattle, Oswin Perera and Harinder Makkar

SRL5035, Monitoring and Control of Residues in Livestock Products, Andrew Cannavan

SUD5027, Control of Ticks and Tick-Borne Diseases Using ELISA, Gerrit Viljoen

TUN5021, Fodder Shrubs as Feed Resources to Improve Livestock Productivity, Harinder Makkar

URT5021, Livestock Development in Zanzibar After Tsetse Eradication, Oswin Perera, Harinder Makkar and Gerrit Viljoen

YEM5004, Improving the Diagnosis of Animal Diseases, John Crowther

YEM5005, Monitoring of Veterinary Drug Residues, Andrew Cannavan

ZAI5013, Improving Animal Disease Diagnosis, Gerrit Viljoen

ZAI5014, Upgrading Laboratory Services for Diagnosis of Animal Diseases, John Crowther

Activities of the Animal Production Unit (Apu) at The FAO/IAEA Agriculture and Biotechnology Laboratory

Quantification of Polyphenols in Tree Foliage to be used for Ruminants Feeding

The utilization of non-conventional forages such as tree leaves as protein supplements in smallholder livestock-farming systems is limited by the presence of polyphenols and related compounds such as tannins. Polyphenols are secondary plant compounds that reduce the usefulness of non-conventional supplements because they bind to proteins making them unavailable to the animal. In addition these compounds are toxic to rumen microbes. The effect that tannins may have on rumen microbial fermentation and thereby on nutrient digestibility by ruminants was studied by Ms Maria Helena LINO BENTO an IAEA fellow who spent four months in the APU last year. Using ^{15}N based approaches, she also investigated the influence of tannins, pectin and polyethylene glycol on attachment of rumen microbes to cellulose and it was shown that pectin has the capability to ameliorate the adverse effects of tannins, but this ability is much lower than that of polyethylene glycol (PEG). As a complement

to this study, work was also carried out in the APU on the development and validation of inexpensive methods to measure tannins in non-conventional forages. This work was carried out by a scientist from Zimbabwe, Mr Victor MLAMBO, who was on a Junior Professional Officer fellowship from May 2003 to April 2004. He simplified and validated the ^{14}C -PEG tannin assay and investigated the relevance of the values obtained for predicting the potential effects of tannins on livestock, in support of the CRP D3.10.22 on use of nuclear and related techniques to develop simple tannin assays for predicting and improving the safety and efficiency of feeding ruminants on tanniferous tree foliage.

Molecular animal genetics

Mapping of Quantitative Trait Loci (QTL) in Sheep for Resistance to Helminth

In collaboration with the International Livestock Research Institute (ILRI) APU will map a backcross population of sheep (Dorper x Red Masai) using a microsatellite

marker strategy. The aim of this project is to identify and subsequently characterize potential QTLs for helminth resistance in that specie. Helminthiasis in small ruminants is one of the major causes of mortality of newborns and its morbidity causes high economic losses, by decreasing the production rates, in areas where sheep and/or goat represent the most important livestock species for small farm holders.

Molecular marker bank for Livestock Characterization

In order to fulfil the increasing demand for standardized genetic markers and DNA samples for livestock genetics

conservation purposes, and based on the technical decisions to be taken during the upcoming ISAG/FAO Biodiversity Workshop (Tokyo, Japan - September 2004), APU will prepare panels of molecular markers. These primers will be available for use by FAO and IAEA Member State institutions.

Training of fellows in APU

Mr. Janis THAILAYIL, a cost-free intern, was trained in molecular biology (Molecular Animal Genetics) from February to April 2004.

Publications

Recent Publications:

A Training Package (CD-ROM): Technique for estimating microbial protein supply in ruminants based on determination of purine derivatives in urine.

The technique may be used as a research tool to improve the utilization of local feed resources for ruminants. This training package is developed as a follow-up application of results of a Coordinated Research Project (CRP) of the Joint FAO/IAEA programme: "Development, standardization and validation of nuclear based technologies for estimating microbial protein supply in ruminant livestock for improving productivity". For more information contact Harinder Makkar

Guidelines and Recommendations for Improving Artificial Breeding of Cattle and Buffalo in Asia



This manual is a Working Document of the RCA Project RAS/5/035 on "Improving Animal Productivity and Reproductive Efficiency", produced with technical support from the Animal Production and Health Section of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture.

Shrub Foliage.



Laboratory Manual "Quantification of Tannins in Tree and shrub Foliage" by Harinder P.S. Makkar, Kluwer-Plenum Press, 2003, ISBN 1-4020-1632-8.

This is the most complete guide available to the analysis of tannins. A battery of tannin methodologies is presented in a simple, clear and easy-to-understand manner.

For more information contact Harinder Makkar.

International Symposium on "Application of gene-based technologies for improving animal production and health in developing countries" October 2003.



Extended Book of Synopses, FAO/IAEA international symposium on applications of gene-based technologies for improving animal production and health in developing countries, 6-10 October 2003, Vienna, Austria (hardcopy and CD ROM available. Contact Harinder Makkar. The Synopses and some PowerPoint presentations can be downloaded from the AP&H Section website.

Proceedings containing full papers will be available by the end of 2005.

In Press:

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 FAO/IAEA Coordinated Research Project on the "Monitoring of Contagious Bovine Pleuropneumonia in Africa Using Enzyme Immunoassays", IAEA TECDOC.

The proceedings of this FAO/IAEA CRP are now available as an IAEA TECDOC through the APHS. The document summarizes the results of the validation and field use of a competitive ELISA for the detection of antibodies to MmSC and its comparison to the CFT. It contains also results on the use of the latex agglutination tests (LAT) which was developed in cooperation with the Moredun Research Institute, UK. The objective of the document is to present results on the surveillance of CBPP which can help national veterinary authorities to plan there surveillance and control programmes.

The cELISA was identified as a suitable and useful test and was now accepted by the OIE Standards Commission along with the CFT as a prescribed test.

In Preparation:

A guidebook dealing with practical aspects of PCR technologies as applied in the veterinary sphere, is being prepared by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture. The manuscript is now being edited and should be available as a publication by the end of 2003. It will also be placed on the AP&H Section website.

Estimation of microbial protein supply in ruminants using urinary excretion of purine derivatives.

Proceedings of the FAO/IAEA International Symposium on Applications of gene-based technologies for improving animal production and health in developing countries

Manual on screening and confirmatory methodologies for veterinary drug residues.

Handbook on regulatory aspects of veterinary drugs and residue control

Laboratory Manual on methods in gut microbial ecology for ruminants

Publications in Scientific Journals and Conference Proceedings

A list of Articles from APHS and APU staff published in Scientific Journals and Conference Proceedings is available on our AP&H Section website at the URL

http://www.iaea.org/programmes/nafa/d3/public/d3_pbl_6.html

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 Cooperation project RAF/0/013 'ICT based training to strengthen LDC capacity'. Contact J. Crowther for further information.

A CD-ROM containing a training package on estimation of microbial protein supply in ruminants from the determination of urinary purine derivatives. Contact Harinder Makkar (h.makkar@iaea.org)

A new batch of CDs with a training package to help artificial insemination (AI) technicians to improve the performance of AI and field services provided to farmers was produced for users with a slow Internet connection and is now available through the APHS. It is also accessible from the AP&H Section website: <http://www.iaea.org/programmes/nafa/d3/index.html>

Information on New FAO titles:

To be regularly informed on FAO new titles, subscribe to FAO-Bookinfo, the free electronic newsletter from the FAO Sales and Marketing Group. All you have to do is to send an E-mail to mailserv@mailserv.fao.org, leave the subject blank and then put in the first line of the message the following: Subscribe FAO-Bookinfo-L

Websites

- The AP&H Section website is being updated on a regular basis. Please feel free to look at it and make comments.
<http://www.iaea.org/programmes/nafa/d3/index.html>
- 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>
- A training package to help artificial insemination (AI) technicians to improve the performance of AI and field services provided to farmers is now accessible from the AP&H Section website (<http://www.iaea.org/programmes/nafa/d3/index.html>). It was produced under an IAEA Technical Cooperation Project – RAF/0/013 – 'ICT-BASED TRAINING TO STRENGTHEN LDC CAPACITY' with the collaboration of the Animal Production & Health Section of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture. This package is also available as a CD ROM from the for users who have no access to internet connection.
- 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>.
- Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture website:
<http://www.iaea.org/programmes/nafa/>
- FAO website: <http://www.fao.org/>



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