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*Child with chicken in Vietnam (courtesy of Le Thi Thuy).*

## To Our Readers

Dear Colleagues,

As part of the Agency's 2006/7 Programme of Work and Budget, we evaluated our regular Co-ordinated Research Project (CRP) activities and our technical support given to ongoing national and regional Technical Co-operation projects (TCPs) and focussed our activities for the Agency's 2008/9 cycle. During this exercise we could identify areas where good performance was achieved as well as those where further improvements were needed – and which we then addressed. We also had time to reflect on our past performance in order to serve the best interests of our Member States (MS). It became apparent that the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture has to be more proactive towards the detection, control and management of emerging diseases, with particular emphasis on transboundary animal diseases and the offering of relevant and effective support to MS. Attention was given to increasing our collaboration with other International Organisations (such as OIE, WHO and CGIAR Centres) as well as our Joint FAO/IAEA divisional activities. The clear advantage that we as a Joint FAO/IAEA programme have is a very proficient laboratory (and expertise) that focuses on our direct support to MS. To this effect I want to highlight our activities related to small ruminant reproduction and breeding in this section of the newsletter.

On a global level, small ruminants are among the most important livestock species. In many developing countries, the contribution of these animal species to the livelihood of poor farmers is very important. Considerable biodiversity exists among these animals and some breeds excel in adaptability to harsh environments, productivity or disease resistance. However, these indigenous genetic resources are generally underutilized in conventional breeding programmes, due in part to inability to select breeds and animals carrying the most advantageous traits and genotypes. The characterization and mapping of genes controlling advantageous traits (quantitative trait loci or 'QTL') and the subsequent use of this information in selection and breeding programmes, could provide a considerable increase in productivity. Therefore, our animal genetics group is directing their efforts at developing and providing gene-based tools to MS for the management of indigenous livestock genetic resources.

In a general sense, our primary goals are to help scientists in MS to use gene based and related technologies to understand the genetic variation underlying the economically important traits in small ruminants. The activities focus on two main topics; the first is to identify chromosomal regions of sheep associated with intestinal parasite resistance. On this we collaborate with the International Livestock Research Institute (ILRI) and the United States Department of Agriculture (USDA) to conduct a genome scan to detect QTL based on a cross between the resistant Red Massai and susceptible Dorper breeds. Preliminary analyses suggest evidence of interesting QTL on several chromosomes. As an objective of several Technical and Collaborative Research Projects in the subprogramme, the technical capacity for DNA analysis selection has been transferred to a number of MS. By further characterizing the QTL, we hope to provide simple assays to these MS that can be used to test their local populations for resistance genes. These assays will be based on single nucleotide polymorphisms (SNP) in genes that affect resistance to parasites and will use simple DNA technologies that can be used at a low cost. In order to identify and develop assays that are relevant for a number of breeds, each SNP must be verified and applied in different populations. We have developed a genetic resource (DNA and Blood) repository bank for small ruminants at our laboratory at Seibersdorf. In order to build this repository, collaboration with different groups was established and arrangements were made to provide our laboratory with samples of blood and DNA from the most representative breeds from different countries. A unique ID has been assigned to each sample and entered into a genetic resource database. As of today, the genetic resource database contains more than 700 blood and DNA samples from 12 countries representing 32 breeds of small ruminants. The DNA bank samples will be used for genetic mapping and this bank will be especially useful to study the genetics of disease resistance. The second main

focus of activity is the bioinformatic analysis of small ruminant genomic information. Our activities in molecular genetics require the support of bioinformatics, which are an integral part of genomics research. For this reason, we have parallel activities designed to increase the technical capacity for bioinformatics of national research institutes of MS, and to enhance their access to genomics information. Much information on studies to identify QTL has already been produced and published in the scientific literature, but the access to this information is often limited, due to various constraints (e.g. lack of resources at research libraries). To improve the availability of genomic information on small ruminants, we have created a web-accessible database for QTL, genes and general DNA sequences for sheep and goats. The database will make available the pertinent results regarding genomic locations of QTL from all known studies on these species.

Finally, through our project on the characterization of small ruminant genetic resources MS were helped to characterize approximately 100 breeds of sheep and goats in Asia. The characterization includes collection of both phenotypic and genetic data, including the genotypes of microsatellites from the standard FAO/ISAG panel. The information will allow the participants to better manage their breeds, by evaluating their biodiversity both within and across breeds. In addition we are building a web-accessible database from which users will be able to view and download data from the CRP. The goal is to make this a global resource, and results from other characterization studies will be made available and scientists will be able to upload their results from new studies as well. By comparing the allelic frequency at common loci across breeds, MS will be able to evaluate the genetic similarity of their breeds with those of surrounding countries and around the world. Breeds with unique genetics are considered to be more valuable for conservation programmes.

We believe these activities offer an exciting and novel way to increase the genomic information on sheep and goats and to disseminate this information on a wide scale. There is little question that gene/genomic tools for disease resistance, wool and meat quality and other traits will be used in future. The use of these genetic markers will help to increase the speed and efficiency of genetic improvements in a population. Making this genetic and genomic information available for application in small ruminant genetic programmes can help make genetic improvements via Marker Assisted Selection (MAS) or Introgression (MAI) a reality. These findings could be subsequently used by the developing MS in breeding genetically superior stock.

Concerning news from the subprogramme, we want to welcome Tony Schlink who joined the Animal Produc-

tion and Health subprogramme in mid August from Western Australia as nutritionist with research experience across a number of livestock species. Tony obtained a Ph.D. in Animal Physiology from the University of Adelaide in biological wool harvesting. On completing his Ph.D. he worked with the South Australian Department of Agriculture as a beef cattle officer before moving to private industry in Sydney evaluating feed additives, growth promotants and control release systems for ruminants. This was followed by a post-doctoral appointment with Melbourne University on the utilization of lupins by reproducing sheep. Experience was then gained in tropical cow-calf nutrition and the evaluation of 'new' pasture and shrub species for ruminant animals in Townsville, northern Australia. From Townsville, Tony moved to Perth, Western Australia, researching wool growth and quality in a Mediterranean environment. Recently he has been working with economy colleagues, modelling water usage in intensive animal industries, to show the sensitivity of these industries to water pricing.

Sadly, we have to say goodbye to Adama Diallo. Adama joined us in 2001 as Head of the Animal Production Unit (APU) at Seibersdorf and has thus completed his 7 year term with the IAEA. He is, however, not completely lost to the subprogramme as he took an Animal Health position with FAO from January 2008 and I am looking forward to work with him in that capacity. Adama was a great asset to the subprogramme as manager of the unit and its activities. He was responsible for the staff, the

budget, the research and development activities, the development, evaluation and validation of diagnostic technologies and their transfer to Member States. He was very well respected within the IAEA and was honoured with the IAEA Director General's Distinguished Service Award (Nov 2007). His dedication and hard work is much appreciated and he will be greatly missed as a friend and colleague.

Both past and future activities are described in detail in this newsletter and are also accessible at our website (<http://www.iaea.org/programmes/nafa/d3/index.html>); I thus need not mention them in this section. Please contact us if you have any further ideas, comments, concerns or questions. As discussed in previous newsletters, the Animal Production and Health subprogramme will continue to move progressively forward and in pace with developments within the livestock field, to optimally serve our Member States.

Finally, I wish you all and your families a happy, healthy and safe new year.



Gerrit Viljoen,  
Head, Animal Production and Health Section



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

## Forthcoming Events

### Consultants Meeting on Preparing the Symposium in 2009

Technical Officer: Paul Boettcher

Approximately every six years, the Animal Production and Health Section of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture holds an international symposium. To this symposium, we invite leading scientists from around the world to share their ideas and perspectives on sustainable livestock production with participants from our Member States. Our previous symposium in 2003 dealt with uses of gene-based technologies to improve animal productivity. We have now started to make plans for our next symposium, to be held in June 2009. We have formed a steering committee of top scientists in the fields of animal health, nutrition and reproduction/breeding to participate in the scientific planning and to ensure we have a compelling and useful programme for participants. These scientists are Mr. Sandor Belak (Sweden), Mr. Santiago Mas Coma (Spain), Mr. Petery Buttery (United Kingdom), Mr. Johann Sölkner (Austria) and Ms. Ann Van Soom (Belgium) and Mr. Norbert Nowotny (Austria). These scientists have been invited to a consultants meeting to be held in Vienna, Austria, on 12 & 13 December 2007. At this meeting, the technical officers and the committee will outline the general subjects of the various sessions and identify plenary speakers to be invited. The programme will include separate general plenary addresses to both open and close the Symposium and two special invited presentations each for health, nutrition and reproduction and breeding.

### Regional Training Course on Integrated Control of Fascioliasis in Latin America (RLA5049)

Technical Officer: Gerrit Viljoen

The regional training course on Integrated Control of Fascioliasis in Latin America will be held in Lima, Peru from 10 to 14 December 2007.

This course has the objective to discuss the regional needs, specific national needs and common problems to address in the area for sustainable control of veterinary fascioliasis; to establish the best approaches and tools for the diagnosis, control and prevention of Fascioliasis, including theoretical and practical training in the diagnostic serological and molecular diagnostic tools and procedures and to determine the epidemiological spread of the disease, by classical and new generation techniques, and to identify areas at risk.

Two experts from Spain will lecture and six participants from Argentina, Bolivia, Cuba, Mexico, Panama and Uruguay will attend this regional training course.

### Consultants Meeting to define Joint Activities between the Animal Production and Health Section in Vienna and the Animal Production and Health Division in Rome.

Technical Officer: Paul Boettcher

The meeting will be held from 14 to 18 January 2008.

The objective of the meeting will be to determine nutritional priorities and to identify jointly beneficial activities and to explore the traceability of animal products.

### Regional Training Course on the Diagnosis of Avian Influenza (Europe)

Technical Officer: Gerrit Viljoen

The regional training course on avian influenza for the European region will be held in 2008. More information on these series of training courses is given below.

### Information relevant for all Training Courses on the Diagnosis of Avian Influenza

Highly pathogenic avian influenza (HPAI) subtype H5N1 re-emerged in 2003 in Asia and from there spread rapidly to Europe and Africa. The H5N1 avian influenza subtype holds a potential human pandemic risk since:

- it is a highly infectious and dynamically evolving disease that spreads rapidly and widely across countries and continents due to the migration routes of especially water and predator birds,
- it is zoonotic in nature causing a high rate of mortality in both birds and humans (from the 278 human cases, 188 resulted in fatalities, i.e. almost 70% mortality rate),
- it threatens national, regional and international trade on poultry and poultry products as a consequence of quarantine regulations,
- it threatens food security and the livelihood of many millions of poor farmers,
- The control of it is beyond the scope and resources of a single country or region.

HPAI has become an important public goods item that quickly has mobilized the international community with objectives to limit or avoid a potential high negative economic impact and also to limit or avoid a possible

human pandemic that will have a catastrophic consequence on human health.

The IAEA has assisted Member States by providing information (laboratory infrastructure, equipment, reagent and consumable needs), diagnostic laboratory guidelines, standard operating procedures for diagnostic tests and training on the use of vaccines and appropriate diagnostic tests. The intervention by the IAEA has prepared Member States to react to disease events in a timely manner. This action has however, to be followed-up and indeed expanded. To control transboundary infectious diseases effectively (case in point avian influenza) the early, rapid and sensitive detection of a harmful introduction is critical as this bears fact on the implementation of control measures such as restrictive movement and trade, the possible implementation of a ring vaccination and possible quarantine/stamping-out/culling strategies in infected areas. Unfortunately, inadequate capacity in many countries is the principal limiting factor for implementing an effective control or even eradicating policy and therefore the building up (or the enhancement of an existing capability) is critical and call for a consolidated international effort. To this effect, the FAO and IAEA through the Joint FAO/IAEA and Technical Co-operation Programmes, organized (1) an interregional training course on the Rapid Diagnosis of Avian Influenza from 20 November to 1 December 2006 at the OIE Collaborating Centre for the application of Molecular Techniques and ELISA in the diagnosis of Animal Diseases at Seibersdorf, (2) an African regional training course from 26 August to 6 September at the Central Laboratory for Veterinary, OC and Poultry Production, Cairo, Egypt, and (3) an Asian regional training course from 19 to 30 November 2007 at the Australian Animal Health Laboratory, Geelong, Australia. It was attended by 73 trainees from Asia, Africa and Latin America. The courses aimed at enhancing trainees' knowledge on the use of highly specific and rapid molecular techniques for the identification of HPAI viruses. In addition to the lecturing staff members of the Animal Production and Health subprogramme, seven international experts provided the trainees with theoretical and practical programmes. The courses focused mainly on RNA purification, the nucleic acid amplification by both classical method (PCR) and real-time or quantitative PCR (Realtime-PCR and QPCR), and gene sequencing for unequivocally identification and characterization of HPAI virus sub-type H5N1 samples. Trainees also received quality management and PCR laboratory set-up guidelines, sampling frame guidelines, procedures for submitting samples to OIE/FAO reference laboratories, and they were updated on the epidemiology of highly pathogenic avian influenza. They were furthermore, informed on the different activities of not only FAO and IAEA (on the control of important transboundary animal diseases and particularly avian influenza), but also of the WHO and the OIE. Particular mentioning was made of OF-

FLU, the OIE-FAO Network on Avian Influenza that has the following mandate to:

- Offer veterinary expertise to Member Countries to assist in the control of avian influenza (AI)
- Share biological material and data
- Develop research on AI
- Collaborate with the WHO Influenza Network on the animal-human interface.

All participants were provided with a CD containing all the lectures and other information provided during the training course, including results obtained during the practical sessions. Although the training course was focused on the rapid and sensitive diagnosis of AI, the epidemiology and characterization of the virus were well received. The after-the-course questionnaire indicated that the course was well appreciated by the participants in terms of course contents, its implementation and for the administrative organization, a fruit of collaboration between three Divisions of the Technical Cooperation and Nuclear Applications Departments of the IAEA. A full report with all information is available at the APH subprogramme.

Capacity building or the enhancement of existing capacities in Member States, with the view to be able to respond to harmful events (e.g. the control of avian influenza and other emerging or re-emerging diseases) is a long term activity and should receive adequate attention. It is therefore foreseen to follow these first training courses up with other (regional) training courses to further support the capabilities of Member States

The training courses held and planned are:

- Interregional Training course from 20 November to 1 December 2006 in Seibersdorf, Austria
- Regional Training Course for Africa from 26 August to 1 September 2007, Cairo, Egypt
- Regional Training Course for Asia 19-30 November 2007, Geelong, Australia
- Regional Training Course for Europe.
- Regional Training Course for Central and Latin America from 1 to 12 September 2008 in Bogotá, Colombia.

### **Research Coordination Meeting (RCM) on diagnosis and surveillance of Peste des Petits Ruminants (PPR)**

Technical Officer: Hermann Unger

The first RCM on diagnosis and surveillance of PPR will be held in Vienna Austria from 31 March to 4 April 2008.

### **Research Coordination Meeting (RCM) on Control of Contagious Bovine Pleuropneumonia (CBPP)**

Technical Officer: Hermann Unger

The second RCM on control of CBPP is planned to be held in April 2008 in Mali.

## Conference on Predicting Disease Patterns According to Climatic Changes

Technical Officer: Hermann Unger

The conference on predicting disease patterns according to climatic changes is scheduled in Trieste, Italy from 12 to 14 May 2008.

This meeting should give disease specialists and epidemiologists an insight into research topics and respective tools for climatic conditions and models for prediction. The knowledge and tool base should be evaluated for applications concerning disease patterns. The consequence of this meeting should be a better cooperation between climatologists and epidemiologists to improve the data base and exchange practises due to better understanding the respective needs and limitations. This could be a very valuable support for ongoing CRP's focusing on a Rift Valley Fever and Avian Influenza influenced by climatic conditions and becoming predictable by climatic forecasts and modelling.

Disease transmission activity can be correlated with climatic conditions as a consequence of low UV radiation due to cloud cover (Influenza), high humidity (bacteria) or the improved replication conditions for vectors (Rift Valley Fever, Malaria). The prediction of climatic conditions and their changes may have major influence on outbreak prediction. So modelling weather patterns indicative for specific outbreak forecasts will have a major impact on emergency preparedness plans. To date, there has yet to be a scientific meeting that brings together epidemiologists and climatologists, in order to improve the exchange of data and their formats, and to cooperate in the prediction and modelling of emerging diseases through climate change.

Topics to be covered are tools to measure climate, information systems and data storage; climatic modelling and forecasting; limitations of weather assessment; integrating epidemiology in climatic models; the establishment of current disease pattern data and how this data could be better collected; what data would an epidemiologist need from climatologists; and epidemiological modelling strategies and their differences to climate models.

Most emerging diseases originate in developing countries. Tools to diagnose these diseases in the different host systems are now getting available and affordable due to the progress in molecular technology. In order to



### Joint ICTP - IAEA Conference on Predicting Disease Patterns According to Climatic Changes

12 - 14 May 2008

Miramare, Trieste, Italy

The Abdus Salam International Centre for Theoretical Physics (ICTP) and the International Atomic Energy Agency (IAEA) are jointly organizing a Conference on Predicting Disease Patterns According to Climatic Changes, to be held from 12 to 14 May 2008 at the ICTP, Trieste, Italy.

Detection of infectious diseases at larger and larger regions is partially due to the improvement in diagnostic systems. Their spreading is also due to changes in transportation systems, in the habitat's extension (especially for vector borne diseases) and to changes in climatic conditions. Therefore one needs to take climate into account in modeling epidemics.

This Conference should give disease specialists and epidemiologists an insight into current research in climate modeling with the aim of improving the predictive power of epidemiological models by integrating climatic data and forecasts.

The influence of climatic conditions and the predictability of epidemics will be discussed also on specific case studies, such as the ongoing Coordinated Research Projects by IAEA focusing on a Rift Valley Fever and Avian Influenza.

Consequence of this meeting should be a better cooperation between climatologists and epidemiologists to improve the data base and exchange practises due to better understanding respective needs and limitations.

#### PARTICIPATION:

Researchers from all countries which are members of the UN, UNESCO or IAEA may attend the Conference. Although the main purpose of the Centre is to help research systems from developing countries within the framework of international cooperation, scientists from developed countries are also welcome to attend. The activity will be conducted in English.

As a rule, travel and subsistence expenses of the participants should be borne by their home institutions. Limited funds are available for those participants who are nationals of, and working in, a developing country, to be selected by the organizers. Such financial support is available only for those who attend the entire activity. There is no registration fee to attend this Conference.

The closing date for the receipt of requests for participation is

8 February 2008

Interested applicants should fill in and submit the Online Application Form that can be found at: <http://agenda.ictp.it/line.php?1981>. You would like to show that CV and a recent list of publications are essential to evaluate applications. Any file attachments should strictly be uploaded on the above site in PDF format.

**2008/05/12 - 2008/1981 - Conference on Predicting Disease Patterns According to Climatic Changes**  
 Site ID: 411981981  
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Trieste, November 2007

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**PRELIMINARY LIST OF SPEAKERS:**  
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 University of Parma, Italy  
 Leopoldo de Saenger  
 University of Vienna, Austria  
 Dennis Jakob  
 Max Planck Institute for Virology, Germany  
 Jeremy Pal  
 Loyola Marymount University, Los Angeles, USA  
 Dirk U Pfeiffer  
 Royal Veterinary College, UK  
 Franz Rubel  
 University of Veterinary Medicine of Vienna, Austria  
 Thomas Seifried  
 Federal Research Centre for Animal Health, Germany  
 Wolfgang Wagner  
 Vienna University of Technology, Austria

**DEADLINE for applications:**  
 8 February 2008

**CONFERENCE WEB PAGE:**  
<http://agenda.ictp.it/line.php?1981>

design studies and surveillance programmes to monitor the risk of disease outbreaks prediction models for these diseases are of enormous help. An integrated approach of modelling and surveillance should help initiating emergency programmes (vaccination, specific treatment, drug supply) timely to reduce disease and losses.

## Regional Training Course on the Diagnosis of Avian Influenza (Latin America)

Technical Officer: Gerrit Viljoen

The regional training course for Central and Latin America will be held 1 to 12 September 2008 in Bogotá, Colombia.

For more information please see 'Information relevant for all Training Courses on the Diagnosis of Avian Influenza' under Future Events: Regional Training Course on the Diagnosis of avian Influenza (Europe).



## Past Events

### Regional Training Course on the Diagnosis of Avian Influenza for Africa

Technical Officers: Gerrit Viljoen/Adama Diallo  
A FAO/IAEA/CIRAD-EMVT Africa Regional Training Course on "Molecular Techniques for the Diagnosis of Highly Pathogenic Avian Influenza" was held from 26 August to 6 September 2006 in Cairo, Egypt. The training course was attended by avian influenza diagnostic technicians and laboratory personnel from 19 African countries and 1 European country. This constituted 27 participants with 26 from Africa (including 5 local participants) and 1 from Europe. For more information please see 'Information relevant for all Training Courses on the Diagnosis of Avian Influenza' under Future Events: Regional Training Course on the Diagnosis of Avian Influenza (Europe).

### Second Research Coordination Meeting (RCM) of the CRP on Gene-based Technologies in Livestock Breeding: Characterization of Small Ruminant Resources in Asia (D3.10.25)

Technical Officer: Paul Boettcher  
This RCM was held from 29 October to 2 November 2007 at the Huazhong Agriculture University, Wuhan, China. The meeting was attended by all eight Research Contract holders, two Research Agreement holders, two Technical Contract holders and one Consultant. In addition, three other scientists participated as official observers.



The purpose of the Research Coordination Meeting was to review the progress achieved by the Research Contract

holders since the last Research Coordination Meeting held in 2005 in Indonesia and to plan and agree on the research programme for 2008 and beyond. All sampling of DNA and collection of phenotypic, farming system and geographical information has been collected and a majority of the genotyping is complete. The primary activities for 2008 will be to complete genotyping, analyse the data, and prepare reports for distribution of results to local stakeholders.

The conclusions and recommendations drawn up from the meeting are as follows:

#### Conclusions

1. Project activities are on schedule. DNA, phenotypic and geographic data and farming system information have been collected from approximately 4000 sheep and goats from 89 breeds/populations.
2. Goats will be genotyped for 15 microsatellite markers; this activity has been completed for 37 breeds. Sheep will be genotyped for 15 to 18 microsatellites; this activity is ongoing at ILRI - China. The markers have been chosen to maximize the possibility of future meta-analyses with large characterization studies previously undertaken in Africa and Europe.
3. Phenotypic, geographic and farming system information has been collected for all breeds. Digital photos have been taken for all animals. Most animals have been individually measured for some phenotypic traits.

#### Recommendations

1. All phenotypic data should be sent to Mr. Omar Faruque, the counterpart from Bangladesh, by March 2008. Mr. Faruque will check and compile the data and redistribute it on a CD by June 2008.
2. The final microsatellite data for both species will be checked and compiled by Mr. Han Jianlin from ILRI and distributed in electronic format by April 2008 for goat and July 2008 for sheep.
3. Final preparations for mtDNA sequencing must be completed by the end of 2007. These activities include production of PCR products and preparation for importation to the IAEA Collaborating Centre in at the Universidade Estadual Paulista in Brazil.
4. Sequencing of mtDNA is to be completed by Mr. Fernando Garcia and results are to be distributed by the end of April 2008.
5. Sheep should be genotyped for one Y-chromosome specific microsatellite. Mr. Jianlin is responsible for completing this work by July 2008. Mr. Garcia will develop and distribute to counterparts a kit for sequencing a sheep Y-chromosome specific SNP. This kit will be distributed by May 2008. Genotyping should be completed by counterparts by July 2008.
6. Investigation will be undertaken regarding the feasibility of genotyping of goats for SNP in the Y-chromosome. Based upon this information, the genotyping will be organized by the Animal Production Unit (APU) of the IAEA and completed by July 2008.
7. Geographic data should be provided to Mr. Paolo Ajmone-Marsan by March 2008. He will check the data for errors and report such errors by April 2008.
8. All data including both phenotypic and genotypic data are to be only shared within the CRP group. Permission must be obtained from the original provider of the data prior to exchange with a third party.



9. A comprehensive review of available data and literature is needed for each breed, including the phenotypic data, historical background, origin, breeding structure, improvement programme, management (e.g. recording) of the breed and population in 2008.

10. All counterparts should gather the data required to complete (as much as possible) the information tables for the Domestic Animal Diversity Information System (DAD-IS) of FAO. This information will be a combination of project data and the review. The compiled forms should be forwarded to the local FAO focal point for Animal Genetic Resources by September 2008.

11. Protocols for genotyping of SNP in functional genes will be developed by the APU and other collaborating institutions and delivered to counterparts upon request.

12. Project counterparts should inform themselves on the use of the software for genotypic analysis identified in the IAEA training manual. Counterparts should report to the IAEA instances for which the manual is not clear and requires editing. Agreement and Technical Contract holders will provide assistance on the underlying theory and interpretation of results.

13. Upon completion of initial data analyses, counterparts should prepare reports to present pertinent results in the local literature.

14. Effective communication is required, and Mr. Jianlin will examine the details of establishing a monthly conference call to which counterparts and experts will participate.

15. A non-official gathering of project contributors will be organized and held in October 2008. The main objectives of the meeting will be to complete data analysis and to outline plans to be undertaken until the third Research Coordination Meeting. Counterparts should attempt to have analysed the data prior to the meeting, so that results can be compared and problems can be rectified.

## WAVLD 2007: Preparing for the Animal Health Challenges of the Future

Technical Officers: Gerrit Viljoen/Hermann Unger

The International Symposium was held in Melbourne, Australia from 11 to 14 November 2007.

The focus was on preparing for the animal health challenges of the future.

The pre-symposium workshop on 'Assay validation, from theory to practice', gave insight into the normative requirements of the OIE initiative for listing assays with the World Animal Health Organisation; problems faced with the implementation of validation templates; and the design of studies and the statistical evaluation of test results. Specifically, the presentations on the use of mathematical procedures for comparison studies with and in the absence of gold standards showed a way forward to the presentation of results of such exercises. This should lead to a more cohesive way of presenting validation data in peer reviewed journals. The presenta-

tions are available under <http://wavld2007.com/preworkshop.php>.

The three-day symposium, visited by more than 400 scientists, was packed with 95 lectures. The main statements were on the development of faster diagnostic techniques applying molecular techniques from simple PCR and isothermal polymerase reactions to micro arrays for 12000 analytes/chip and their potential application in the veterinary field. The rise of emerging diseases lacking diagnostics like SARS highlighted the importance of traditional techniques like electron microscopy for a primary diagnosis, but as well molecular methods to quicker gain information on the genetic background of such new pathogens to classify them properly and to develop specific tests and even therapy strategies. As 75% of emerging diseases have an animal disease background, a one-medicine approach, i.e. veterinarians and medical researcher cooperating, would benefit both clienteles.

A number of presentations focused on the need to improve diagnostic procedures in the field and the direct reporting of results via GSM or satellite. A prototype machine was displayed and conflicting issue like who will gather and evaluate the data, verification of reported results and QC monitoring were debated. This approach will have a major impact on disease management, as it combines the speed of modern diagnostics and a centralized information and reaction strategy.

A few new techniques were presented such as the LATE PCR (<http://www.brandeis.edu/projects/wanghlab/>) and the application of LAMP PCR for FMD ([www.iah.bbsrc.ac.uk](http://www.iah.bbsrc.ac.uk).) which stand a good chance on impacting on disease diagnosis in the near future. Of course the old ELISA is still the tool for surveys and new ones are constantly being developed for a large number of diseases.

There was opportunity to discuss with industry and scientist the way forward and to realize that APH is already on the right track for the 'one-medicine' approach.

## Regional (AFRA) Training Course on Interaction between Reproduction and Nutrition (RAF5054)

Technical Officer: Anthony Schlink

The training course on interaction between reproduction and nutrition took place in Cairo, Egypt from 11 to 15 November 2007.

The course was organized under the AFRA Regional Project



RAF5054 Improvement of Livestock Productivity through an Integrated Application of Technologies. There were twenty-six official participants from 22 countries plus observers who participated on individual days. The objective of the training course was to provide training on interaction between reproduction and nutrition. This provided the participants with the biological principles of nutrition and reproduction and how they interact to effect reproduction in ruminant livestock. This understanding will help the participants improve livestock production within their own livestock industries by being able to identify constraints to livestock production and the opportunities provided using the technologies presented. The workshop was organized and hosted by Professor Ahmed Essan Fekry and his staff in the Animal Physiology Research Unit, Egyptian Atomic Energy Authority. The training course was supported by two IAEA experts (Professor Graeme Martin of the University of Western Australia and Dr. Anthony Ologbobo, University of Ibadan, Department of Animal Science, Nigeria). The course also included a field trip to Dina Farm, an integrated dairy farm approximately halfway between Cairo and Alexandria. The integrated dairy is milking 7000 Holstein cows using predominantly Californian Holstein blood lines. The farm design is similar to large-scale irrigated dairy farms in the USA. Forage is grown under central pivot irrigation to



feedlot the milking cows, male calves are also retained on the farm and grown in feedlots for meat production. The

milk is processed as fresh milk, dried or converted to cheese on the farm. The farm also produced a range of horticultural products. The farm operates six retail outlets in Cairo that are directly supplied by the farm. Although the farm is integrated, it is managed as a number of separate units. This farm is one of ten of this size plus some 200 small scale farms based in irrigated water along the Nile. The aquifer is re-charged by Nile water and is of high quality with low levels of salt and other contaminations. Water use by various aspects of the farm operation are continuously monitored to prevent overuse of water in the farms operation and to prevent damage to the aquifer.

Some of the topics covered in the training course were:

- Feeding standards for optimum reproductive performance
- Basic reproductive endocrinology
- Nutritional and metabolic signals in the reproductive system

- Nutritional management, heat stress and reproductive efficiency
- Theory and practices of radioimmunoassay
- Body condition score

The implication and the role nutrition can play in reproduction are summarized in the two following papers. The first by Martin et al. (2004) Natural methods for increasing reproductive efficiency in small ruminants. *Animal Reproduction Science* 82–83: 231–246 examines strategies for feeding during the reproductive cycle to increase productivity and profitability in small ruminants. The second paper by Chagas et al. (2007) Invited Review: New perspectives on the role of nutrition and metabolic priorities in the subfertility of high-producing dairy cows. *Journal of Dairy Science* 90:4022–4032 examines postpartum anoestrus. This paper reviews the current state of knowledge in postpartum anoestrus and highlights directions for future research.

### Regional Training Course on the Diagnosis of Avian Influenza (Asia)

Technical Officers: Gerrit Viljoen/ Adama Diallo

A regional training course on Molecular Techniques for the Diagnosis of Avian Influenza was held in Geelong, Australia from 19 to 30 November 2007.

This training course was co-sponsored by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture and CSIRO, Australia.

For more information please see 'Information relevant for all Training Courses on the Diagnosis of Avian Influenza' under Future Events: Regional Training Course on the Diagnosis of Avian Influenza (Europe).

### Consultants Meeting to Plan a CRP on Radiation Induced Mutations in Grain Crops to Improve Straw Digestibility for Ruminant Livestock

Technical Officer: Anthony Schlink and Madelaine Spencer

The consultants meeting on the identification of research needs for improving digestibility through mutational breeding, and to identify future areas of research in the plant-animal interface was held at the IAEA, Vienna, from 19 to 22 November 2007.



Five consultants (Dr. Jinsong Bao, China; Professor Peter Neumann, Israel; Dr. Karen Beauchemin, Canada; Dr. Hans-Joachim

Jung, USA; and Dr. Michael Blummel, India) with expertise in plant breeding, plant physiology and rumi-

nant nutrition from national agricultural research organizations and universities, attended the meeting together with staff members of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture.

The consultants presented state-of-the-art reviews in their areas of expertise. The debate was indeed challenging but very fruitful. The most important output of the meeting is induced mutation can be a powerful tool for improving crops residues digestibility. However, this response needs a comprehensive review of the parameters involved from the plant as well as from the animal aspects with some pilot projects prior to any generalization of the concept. Therefore, the meeting decided to envisage the implementation of a Coordinated Research Project on: Strategies to develop a "Proof of concept" that food-feed crops can be selected for improved productivity and nutritive value for livestock using mutation breeding and complementary biotechnologies". A number of options were proposed to advance the preliminary screening of individual plants from breeding programmes to have the capacity to screen large number of plants for ruminant nutritive value within the constraints of a plant breeding programme. A well focused area for the CRP was identified that will have significant impact on livestock production, where crop by-products are an important component in livestock feeding. They also identified other areas for future research in the area of the plant-animal interface.

Conclusions and recommendations were:

- The potential use of mutation assisted breeding to enhance nutritive value of fodder for livestock should be investigated.
- To define the 'call for proposal' in a way to target groups to get a more focused approach.
- The Agency should make an inventory of on-going and planned projects related to plant breeding for improved nutritional value to ensure synergy and avoid duplication.
- To focus on a maximum of two crop residues (from rice and groundnut or cowpea). The research groups with strong institutional support (i.e., existing programmes and resources with these crops) should be given priority.

- To give priority during the selection process to groups already working on either mutation or conventional crop improvement for nutritive value, as well as groups with established crop-animal linkages.
- To consider increasing the funding award per contract holder with the possibility of having fewer contracts under the CRP.
- To conduct an evaluation of the CRP after 3 years and decide whether to extend or curtail the project.
- M2 and M3 plants should be grown under the best possible conditions (fertilizer, water, plant health) with these conditions thoroughly documented as baseline for future studies on developing novel methods for assessing feed quality.
- To consider funding a technical project to a research team that has the capacity to conduct *in vitro* studies and/or animal metabolism studies using stable isotopes.
- Groups must have the capacity to publish results in peer reviewed scientific literature.
- Evaluate the impact of the mutant trait after introgressing into other varieties.
- Consider that the IAEA explore the possibility of using non-destructive advanced nuclear technologies to determine plant cell wall structure in vegetative tissues.

## Consultants Meeting on Foot and Mouth Disease (FMD) Research Being Undertaken

Technical Officer: John Crowther

The consultants meeting on FMD research currently undertaken was held in Vienna Austria from 4 to 7 December 2007.

The objective of this meeting is to ensure that research conducted under various programmes on FMD are co-ordinated and built on each other to avoid duplication and competition and to ensure the maximum use of available resources as well as the identification of additional resources needed to realistically achieve the research outcomes needed for control and eventual eradication. A key process will be the identification of research gaps. A full report will be given in the next Newsletter.

## Ongoing Activities

### Education to Improve the Quality of Research in Developing Countries

Technical Officer: John Crowther

The site which holds the education package under development can be visited under URL: [researcher-training.org](http://researcher-training.org).



## Coordinated Research Projects

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

Technical Officer: Paul Boettcher

The primary activities of this CRP have been completed. The final RCM was held in Edinburgh, UK, from 4 to 8 December 2006. The CRP was judged to be successful by project participants, as most of the interventions applied to improve dairy productivity were found to be economically beneficial, in terms of return on investment. Final reports are now being prepared for publishing as an IAEA-TECDOC. In addition, the reports on Participatory Rural Appraisals and Economic Opportunity Surveys performed in the initial phase of the CRP have now been published and released as a Special Issue of the scientific journal *Tropical Animal Production and Health*. Hard copies of the Special Issue and pdf files of individual articles are available upon request.

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

Technical Officer: Paul Boettcher

There are currently eight Contract holders and five Agreement holders in this CRP. The second RCM was held from 19 to 21 April 2007 at the Department of Animal Sciences at the University of Illinois Urbana-Champaign. The project is progressing as planned toward its objectives. The activities being undertaken at the moment are the identification of plants and plant materials that reduce the production of methane when fermented *in vitro*. In addition, six of the eight RCH have developed and are applying an *in vivo* system of measuring methane production to test and verify the results obtained *in vitro*. Several plant compounds have been identified that merit additional research.

### **Gene-based Technologies in Livestock Breeding: Phase 1: Characterization of Small Ruminant Genetic Resources in Asia (D3.10.25)**

Technical Officer: Paul Boettcher

The nine institutes participating in the project have sampled DNA from approximately 4000 individuals from approximately 90 breeds of sheep and goats. The genotyping of goat breeds has been largely completed. Genotyping of the sheep samples is in progress at the Joint ILRI/CAAS animal molecular genetics laboratory in Beijing. In addition, the breeds are being genotyped for microsatellites and single nucleotide polymor-

phisms (SNP) on the Y-chromosome and the mitochondrial d-loop of a subset of animals from each breed will be sequenced. The IAEA Animal Production Unit in Seibersdorf is developing protocols for evaluation of SNP in various candidate genes that may influence traits of economic importance in small ruminants. The genotyping needed for basic genetic characterization is expected to be completed by July 2008. Data analysis will continue through the end of 2008. Phenotypic and farming system information has been collected for each breed as well, and will be inserted into the Domestic Animal Diversity Information System (DAD-IS) of the FAO.

### **Veterinary Surveillance of Rift Valley Fever (D3.20.23)**

Technical Officer: Gerrit Viljoen

Rift valley fever (RVF) is a mosquito borne viral disease affecting both livestock and people. In animals it mainly causes abortions while humans show influenza like symptoms leading in a small percentage to death. The disease is endemic to Africa with sporadic major outbreaks following extreme humid conditions. In 2000, imported RVF infected cattle from Somalia caused an epidemic on the Arabian Peninsula resulting in the death of nearly 300 people and several thousand abortions in ruminants. This expansion in the epidemic area to the Arabian Peninsula raises the possibility of RVF spread to other parts of Asia and Europe, especially since RVF virus (RVFV) can be spread by a wide range of mosquito vectors.

The CRP focuses on improving the serological and molecular diagnostic capacities of Member States, with reference to Rift Valley Fever (RVF). This will be achieved by evaluating, validating and standardizing existing and newly developed serological tests for the surveillance of RVF and by introducing and transferring suitable molecular, as well as isotopic technologies, for virus detection and characterization. Genomic and genetic techniques will allow for rapid and early virus detection and genetic typing, without the risks of accidental laboratory infection. This should enable participants of the CRP to develop, and/or use, harmonized protocols and procedures, and also to exchange their research data and findings. The implementation of validated serological techniques (for example ELISA) will help to determine the RVF sero-prevalence and/or conversion status of individual animals and herds; while the molecular techniques will assist in the rapid and early detection of the virus to enable the timely implementation of quarantine and control measures, including the differentiation between vaccine and field strains.

The recent outbreak of Rift Valley fever in Sudan is

alarming , where about 164 humans have died since August 2007 of the disease.

### **The Control of Contagious Bovine Pleuro Pneumonia in Sub-Saharan Africa (D3.20.24)**

Technical Officer: Hermann Unger

The field work for the evaluation of the two CBPP ELISA's is continuing and some data arrived in Vienna. These will be statistically evaluated in December to produce a report for the coming RCM. M. Greiner and I. Gardener promised to support this with their statistical expertise.

The skin-testing exercise with LPPQ in Angola and Zambia did show no side effects of the preparation, but at the same time no skin reaction at all. Apparently the expression antigen is too small for recognition by dendritic cells and the use of an adjuvant is currently being explored.

Lymphocyte stimulation assays for CBPP were carried out by J. Joris in Nairobi. The results with heat inactivated Mycoplasma preparations did not give a clear cut picture. Interferon gamma reactions were recorded for some infected as well as for some non-infected animals. The work will be continued.

J. Busse started with his work on molecular epidemiology and some 20 Mycoplasma strains are currently under investigation. To obtain current strains, culture media and sending material was sent out to the participating scientists and some new material is expected soon in Vienna.

The next RCM will take place in Bamako/Mali from 21 to 25 April 2008. I hope all CRP members will be able to attend.

Unfortunately we faced some logistic problems in the last months. The LPPQ ELISA production was discontinued by the manufacturer and all efforts to establish a new production failed so far. It is anticipated to start again early in 2008 to have the new kit ready for the RCM.

### **The Early and Rapid Diagnosis of Transboundary Animal Diseases such as Avian Influenza (D3.20.25)**

Technical Officer: John Crowther

Most contract renewals have been sent and will be considered for funding. The participants have all maintained a high level of work in their countries dealing

with The CRP is stalled since the development of a rapid pen side technology has not been forthcoming. A new commercial system will be exploited soon into 2008 to accelerate progress in the instant testing of avian influenza as well as set up the model for all livestock diseases.

### **The Early and Sensitive Diagnosis and Control of Peste des Petits Ruminants (PPR) (D3.20.26)**

Technical Officer: Adama Diallo/Hermann Unger

PPR is a highly infectious transboundary disease of small ruminants and is part of the list of animal diseases which outbreaks have to be notified to the World Organization for Animal Health (OIE). The geographical distribution of the disease has considerably expanded in the ten past years. Until recently, its endemic areas were located between Sahara and the equator in Africa. However, in 2007, some countries south of the equator such as Kenya and Uganda witnessed PPR outbreaks. The Democratic Republic of Congo benefited an FAO Technical Cooperation Project (TCP) to control an important PPR outbreak. In Asia, for the first time China officially declared a couple of PPR outbreaks. To respond to the numerous demands on the diagnosis of PPR, the IAEA has initiated a CRP on PPR. This new project aims at standardizing/validating existing PPR diagnostic tests and developing new ones for a rapid, sensitive and specific identification of the disease. Following evaluation of the numerous proposals that were received following a call for submissions, eleven were awarded financial support from the IAEA. Contract holders for these selected proposals will work in collaboration with three agreement holders from France, Sweden and the UK. The first meeting of this CRP will be held in Vienna in April 2008.

### **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 sent to the Senegal laboratory directly (Dr. Joseph Sarr; [Josarr@refer.sn](mailto:Josarr@refer.sn)).

## General information applicable to all Coordinated Research Projects

### Submission of Proposals

Research Contract proposal forms can be obtained from the IAEA, the National Atomic Energy Commissions, UNDP offices or by contacting the Technical Officer. The form can also be downloaded from the URL <http://www-crp.iaea.org/html/forms.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.asp>

For further information contact Roswitha Schellander (r.schellander@iaea.org)

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

## Development of a Peste des Petits Ruminants (PPR) Marker Vaccine and Diagnostic Test.

The APU is collaborating with many other institutions in Europe and Africa to develop a PPR marker vaccine with companion test that would enable differentiation of vaccinated animals from infected animals and thereby facilitating the epidemiosurveillance and control of the disease. In that project, the APU is in charge of mapping the virus nucleoprotein (N) for the identification of sites non indispensable to the virus life-cycle and where the marker can be introduced. In previous AP&H newsletters, we reported on results that were obtained on mapping the sites involved in the N protein self interaction to form the viral nucleocapsid. Here we report on the study of the interaction of N with the virus matrix protein (M), an essential step in the formation of the virus particle. By different methods, we identified on N 4 sites that are involved in its interactions with M. These sites are located in the middle and the C-terminus of N. Although two of the peptides seem to constitute major binding sites, each of the identified peptides can be deleted without affecting the internali-

zation of the nucleocapsid into the envelope for the formation of the virus particle.

Along with the N mapping to identify the potential marker site on the genome of the PPR vaccine, APU is also putting efforts on the development of new PPR test for PPR serology. To that effect, monoclonal antibodies (mAb) anti PPRV nucleoprotein were produced and evaluated in competitive ELISA for the specific measurement of antibodies anti PPR in sera. This test is cross-reacting with rinderpest virus antibodies. Because of that, research was carried out to look for other monoclonal antibodies. Now, mAb anti PPRV haemagglutinin protein (H), an external virus glycoprotein, has been produced.

## Molecular Epidemiology of Capripox virus Infection and Development of Molecular-based Diagnostic Test.

The Capripox genus is composed of three closely related viruses: goatpox, sheeppox and lumpy skin disease (LSD) viruses with natural hosts being goat, sheep and cattle respectively. Most of the strains grow readily in goat, sheep or cattle although their pathogenicity may differ according to the virus origin: goat



strains being most pathogenic in goat than in sheep and vice versa. The diseases they cause are of a transboundary nature and are on the World Organisation for Animal Health (OIE) list of important animal diseases that need to be notified.

The epidemiology of capripox virus infections appears complex. Indeed if the endemic zone of lumpy skin disease (LSD) seems to be unique, both goat and sheep pox diseases are. It is not possible to distinguish clinically these small ruminant capripox virus infections. Moreover, they share apparently nearly the same geographical distribution, Asia, the Middle East and Africa, with the exception of North Africa where only sheep pox is reported. Two years ago, with the financial support of the French Ministry of Foreign Affairs and in collaboration with partners in France and Africa, APU embarked on a project for the development of capripox diagnostic tests and for the molecular epidemiology of these viruses. For that APU has received about 20 goat and sheep pox virus strains from Africa, Turkey and United Kingdom. The sequence of full genome length of a capripox goat strain has been determined recently and partial sequences of gene from other strains are now available. These gene sequence information will be used for molecular epidemiology of sheep and goat pox viruses. A PCR test has now been developed for the specific differentiation of goatpox virus from sheeppox virus. This test needs to be validated on more field pathological samples.

### **Development of genetic resource (DNA and Blood) repository bank for small ruminants.**

As an objective of several current and planned Technical and Collaborative Research Projects in the APH, the technical capacity for DNA analysis and marker assisted selection has been or will be transferred to a number of MS. However, in order to identify and develop assays that are relevant for a number of breeds,

## **Training in the APU**

### **Internship**

Ms. Myriam Soltani, student at the Chemistry School of Montpellier in France joined the APU in June for 6-months internship. She has been involved in the mapping of the Peste des Petits Ruminants virus nucleoprotein (N) in view of identifying on this protein a non-essential fragment to be deleted and to serve as a negative marker in the vaccine strain. Ms Soltani was mainly involved in the mapping of zones of N which are involved in its interactions with the phosphoprotein. This protein is the co-factor of the viral nucleic acid polymerase and thus is involved the transcription and replication of the viral genome. During, her stay in APU, Ms Soltani has been trained on gene amplification,

each SNP must be verified and applied in different populations. For that validation, the Animal Production Unit at the Agency's Laboratories at Seibersdorf developed a genetic resource (DNA and Blood) repository bank for small ruminants. In order to build this repository, collaboration with different groups was established and arrangements were made to provide APU with samples of blood and DNA from the most representative breeds from different countries. A unique ID has been assigned to each sample and entered in genetic resource database (GR-db) which was created for this purpose. As of today, genetic resource database (GR-db) contains 726 blood and DNA samples from 12 countries representing 32 breeds of small ruminants. The DNA bank samples will be used for genetic mapping and this bank will be especially useful to study the genetics of disease resistance.

### **Development of Restriction Fragment Length Polymorphisms (RFLPs) genetic markers for helminth resistance in sheep.**

Comparative mapping has been used in this activity to fine map a chromosomal region (Sheep chromosome 3) and improve our ability to find genes that may be responsible for helminth resistance. More than 800 genes have been selected for screening based on the cattle chromosome 5. The genes were then searched for their putative functions. This step identified 149 genes involved in the immune response that were selected as candidates for further analysis. Then tests to detect Single Nucleotide Polymorphisms (SNPs) in the selected genes were applied. The PCR reactions were performed and the products were directly sequenced. Further sequencing of different breeds revealed 95 SNPs at different genes. Twenty two PCR-Restriction Fragment Length Polymorphisms (RFLPs) used as genetic markers were developed for this activity.

DNA cloning, DNA sequencing, production of recombinant protein in the baculovirus system and on ELISA test.

### **Internship report**



My name is Irene Guendel and I was a cost-free intern at the genetics department of the Animal Production Unit in the IAEA's Seibersdorf Laboratories.

I was born and lived in Costa Rica until I had the amazing opportunity of carrying out my undergraduate degree at the Victoria University of Wellington in New Zealand; where

I finished a Bachelor of Science in Cell and Molecular Bioscience in late August 2006.

After taking some time off, I proposed a small project at the National University in Costa Rica (UNA) regarding a special course for advanced chemistry and biology students on molecular visualization freeware and their applications. After it was approved, I visited the university as a fellow and participated in several activities such as assisting in teaching third year genetics laboratories, assisting the genetics research laboratory, and teaching the special module I had organized. While in my home country, I was informed that I had been granted a 10 month internship at the Agency and soon after, I commenced my work on April 2007.

This experience was invaluable. I was able to put to test my knowledge and I was challenged in many ways. I was trained in many aspects of quantitative and molecular genetics by my supervisor, Dr. Massoud Malek, and Dr. Ericka Pestana in a very understanding and knowledgeable manner.

My work revolved around the development of an analysis system for detection of Single Nucleotide Polymorphisms (SNP) in the DNA of sheep and goat and assisting in the creation of a database that will be used by counterparts in the Member States. The final goal of this project is the application of genomics for the genetic improvement of livestock.

Most recently, I have been awarded an OAS scholarship that will allow me to continue my post-graduate studies at the George Washington University, Washington D.C., in the field of genomics and bioinformatics.

Surely, the skill and technique familiarity I have gained from the APU-NAAL will be of great advantage for me in the immediate future.

I am very thankful for this remarkable chance that I had to expand my professional and academic experience, as well as for the wonderful people I have met along the way.

## Fellowship

Ms. Ana Gabriela Murguia Quintana, assistant researcher in the field of molecular biology and genetics at the University of Peruana Cayetano Heredia (UPCH) in Peru joined the APU in Oct 2007 for a two-months fellowship. She is supported by the IAEA Technical Cooperation (TC) Department through the TC project PER5029. The main objective of her work is in the area of alpaca genomics: identification of expressed genes and genetic markers associated with productivity and mortality of embryos. She will receive training on site during her stay to use various tools such as Real Time PCR to identify genes related to the cause of early mortality in embryos. She will be trained on how to use available information on the public databases to select candidate genes for her study. She also assists APU-IAEA in the implementation of the new technology of Single Nucleotide Polymorphisms (SNP) analysis for sheep by developing Restriction Fragment Length Polymorphisms (RFLPs).

# Technical Cooperation Projects

TC Project Description	TO
ANG/5/004 Monitoring and Control of Transboundary Animal Diseases <b>Objective:</b> To strengthen the diagnostic capacity of the Central Veterinary Laboratories (CVL) in Luanda and Lubango to monitor and control trans-boundary diseases, particularly contagious bovine pleuropneumonia (CBPP) and trypanosomosis.	Crowther
ANG/5/007 Improvement and Veterinary Assistance to Local Small Stock Breeds (Not yet funded) <b>Objective:</b> The sustainable improvement of small-scale livestock production systems.	Viljoen
BEN/5/002 Diagnosis and Control of Animal Diseases <b>Objective:</b> Assistance for the control and diagnosis of major diseases affecting livestock.	Crowther Viljoen
BEN/5/003 Veterinary Drug Residue Monitoring Programme <b>Objective:</b> To develop a capacity for veterinary drug residue monitoring in livestock products.	Cannavan Byron Viljoen
BKF/5/002 Development of a Veterinary Medicine to Combat the Fowl Pox Virus <b>Objective:</b> To make available to traditional poultry farmers, rural population medicines against fowl pox virus based on extracts of galls from <i>Guiera Senegalensis</i> , thus reducing the poultry mortality rate in traditional poultry farming systems.	Viljoen
BKF/5/006 Establishment of Feeding Tables for Feedstuffs that are Locally Available to Stockholders in Burkina Faso <b>Objective:</b> To improve the reproductive performance of local livestock bred through food supplementation strategies, develop feeding table for locally available food resources, characterize genetic types of cattle used for milk production, improve the effectiveness of artificial insemination on local cattle breeds, and train a qualified team on animal production (nutrition, feeding, reproduction and genetics).	Boettcher
BOL/5/016 Diagnosis & Molecular Characterization of the Foot & Mouth Disease Virus <b>Objective:</b> To improve and strengthen the system of epidemiological surveillance of the national programme for the eradication of foot and mouth disease.	Crowther
BYE/9/006 Rehabilitation of the Chernobyl-Affected Territories <b>Objective:</b> To minimize the impact of the Chernobyl accident on human health and to create favourable conditions for the sustainable development of the affected territories.	Crowther
CAF/5/002 Assistance for Epidemiological Surveillance of Animal Diseases <b>Objective:</b> To strengthen the diagnostic capacity of the Central Veterinarian Laboratory (LCAVET) to monitor and control major animal diseases.	Unger
CMR/5/015 Use of Nuclear Techniques for Improving Ruminant Productivity & Disease Control <b>Objective:</b> Develop capability for improved breeding by disease control and artificial insemination.	Unger Boettcher
CPR/5/014 Increasing the Productivity of Crop/Livestock Production System <b>Objective:</b> To increase livestock production in Northwest China using appropriate feed supplementation strategies coupled with achieving a sustainable increase in wheat and rice production through the application of biofertilizers.	TO Nutr.



TC Project Description	TO
ELS/5/010 Improving Nutrition Practices and Reproductive Efficiency in Cattle <b>Objective:</b> To increase milk production and profitability of dairy farms through development and use of appropriate feeding strategies using locally available feed resources and enhancing reproductive efficiency.	TO Nutr
ERI/5/003 Monitoring and Control of Transboundary Animal Diseases <b>Objective:</b> To strengthen the diagnostic capacity of the Central Veterinary Laboratory to monitor and control trans-boundary diseases, particularly foot and mouth disease and contagious bovine pleuropneumonia.	Viljoen/Unger
ERI/5/005 Zoonotic (diseases that can be transmitted from animals to humans) Disease Control and Analysis of Veterinary Residues in Foods <b>Objective:</b> The objective of the project is to determine: 1. The epidemiological prevalence of brucellosis and tuberculosis in the major dairy producing areas; 2. Baseline data on veterinary drug residues in milk and meat products.	Byron/Unger
ETH/5/012 Integrating Sterile Insect Techniques for Tsetse Eradication <b>Objective:</b> To eradicate the tsetse fly from the southern Rift Valley, thereby creating an environment conducive to livestock development and improved agricultural production.	Feldmann/Viljoen
ETH/5/014 Monitoring and Control of Major Animal Diseases <b>Objective:</b> To strengthen the diagnostic capacity of the National Veterinary Institute to monitor and control trans-boundary diseases, particularly foot and mouth disease and contagious bovine pleuropneumonia.	Viljoen
GAB/5/002 Diagnosis and Control of Animal Diseases (not yet funded) <b>Objective:</b> To aid identification and control of livestock diseases.	Crowther
HON/5/002 Improvement in the Nutritional and Sanitary Conditions of Cattle to Enhance their Productivity through Nuclear Methods <b>Objective:</b> To enhance the national capabilities for developing feeding strategies, improving the reproductive status of cattle and diagnosis of diseases in livestock herds through isotopic techniques.	Viljoen/TO Nutr
HON/5/004 Improving the Nutrition and Health Conditions of Livestock in Honduras in Order to Increase Productivity and Reproductivity, Phase II (not yet funded) <b>Objective:</b> To strengthen and improve livestock production in Honduras.	TO Nutr
INS/5/032 Improving Beef and Dairy Cattle Production in Yogyakarta <b>Objective:</b> To develop supplementary feeding strategies based on locally available agricultural by-products; to improve reproductive performance through artificial insemination (AI); and to establish cost-effective cattle production systems to improve the economic status of cattle farmers.	Boettcher/TO Nutr
INS/5/034 Development of Environmentally Sound Livestock and Agricultural Production <b>Objective:</b> To improve livestock productivity without adversely affecting the environment through improved feed supplementation strategies, managing nutrient waste on farms and reducing methane emissions.	Schlink
INT/5/148 Establishing Quality Systems in Veterinary Testing Laboratories <b>Objective:</b> To establish quality systems in 15 selected laboratories in Africa (5), Asia and the Pacific (5), and Latin America (5), and to train at least 15 specialists from these laboratories using the materials already available on this subject.	Viljoen/Crowther
IRA/5/012 Preparation of ELISA Kits for Diagnosis of Foot and Mouth Disease <b>Objective:</b> To establish the ability to prepare standardized assays for use in foot and mouth disease (FMD) control.	Crowther
IVC/5/028 Surveillance and control of African Swine Fever <b>Objective:</b> To diagnose, control and monitor the prevalence of African Swine Fever (ASF) from the pig population in Côte d'Ivoire using nuclear techniques and related techniques.	Diallo/Unger

TC Project Description	TO
MAG/5/012 Increasing Self-sufficiency in Domestic Meat and Milk Production <b>Objective:</b> To develop integrated nuclear technique-based approaches for better nutrition, reproduction, and disease control of dairy cattle.	TO Nutr
MAU/5/002 Improving the National Capacity in Diagnostics for Animal Diseases (Infection and Parasitic Diseases) <b>Objective:</b> To strengthen the diagnostic capacity of the Centre National D'Elevage et de Recherches Veterinaires (CNERV) to monitor and control transboundary animal diseases, particularly foot and mouth disease and contagious bovine pleuropneumonia.	Unger/ Diallo
MLI/5/019 Improving Pneumopathies Diagnosis in Ruminants Using PCR <b>Objective:</b> To improve knowledge about the epidemiology of the dominant respiratory pathologies affecting small ruminants in Mali's agro-pastoral areas through improving the diagnosis of pneumopathies in small ruminants to support the national control and eradication programme.	Viljoen/Diallo
MON/5/012 Monitoring of Residues in Livestock Products and Surveillance of Animal Diseases <b>Objective:</b> To develop a capacity for veterinary drug residue and contaminant monitoring in livestock products and to expand serosurveillance capabilities to achieve rinderpest and foot and mouth disease (FMD) free status in the country or specific zones.	Cannavan/Crowther
MON/5/013 Diagnosis and Surveillance of Transboundary Animal Diseases and Production of Diagnostic Reagents <b>Objective:</b> To obtain international recognition of freedom from several transboundary animal diseases, to develop a capacity for the local production, standardization and validation of diagnostic reagents and diagnostic kits, and to establish a quality system for diagnosis of transboundary animal diseases using the local produced diagnostic kits.	Crowther/Viljoen
MON/5/016 Improving Productivity of Cattle, Camels and Yaks Through Better Nutrition and Reproductive Management (not yet funded) <b>Objective:</b> To increase milk, meat and wool production of yaks, cattle and camels by improving the quality and quantity of feed with high nutritional value and tolerance to low temperature and improving the genetic potential using artificial insemination coupled with radio immunoassay for progesterone.	Boettcher/Viljoen
MOR/5/030 Improving Sheep and Goat Production in Morocco through Genomic and Reproductive Physiology Characterization with the Help of Radio-immunoassay and Molecular Techniques (Not yet funded) <b>Objective:</b> Increase sheep and goats for consumption and producers' revenue while preserving natural resources.	Boettcher
MYA/0/006 Human Resource Development and Nuclear Technology Support <b>Objective:</b> To upgrade and strengthen the skills and capabilities of human resources within the broad range of the applications of nuclear science and technology.	Crowther
MYA/5/012 Diagnosis and Control of Swine Vesicular Disease and Swine Brucellosis <b>Objective:</b> To diagnose swine vesicular disease (SVD) and swine brucellosis; to improve control of these two diseases; and to increase pig production.	Crowther
MYA/5/013 Integrated Approach for Enhancing Cattle Productivity <b>Objective:</b> To improve smallholder dairy cattle production in Yangon and Mandalay regions.	Crowther
MYA/5/015 Strengthening the National Capacity for the Production of Veterinary Vaccines <b>Objective:</b> To enhance the national capacity for quality vaccine production to support efforts to control infectious diseases in livestock production, particularly FMD.	Crowther/Cannavan

TC Project Description	TO
NAM/5/007 Control of Animal diseases in Northern Namibia <b>Objective:</b> To create a sustainable veterinary diagnostic service that will contribute to the control of the major diseases affecting livestock in the northern parts of the country.	Viljoen
NER/5/011 Upgrading Laboratory Services for Diagnosis of Animal Diseases <b>Objective:</b> To support the Government effort in controlling main livestock trans-boundary diseases, mainly contagious bovine pleuropneumonia (CBPP), peste des petits ruminants (PPR) and foot and mouth disease (FMD). To help improve the national animal disease diagnosis capabilities at the Laboratoire Central d'Elevage (LABOCEL) in the use of modern techniques to obtain specific and rapid results with focus to CBPP, PPR and FMD.	Diallo/Unger
NER/5/013 An Integrated Approach for Improvement of Livestock Productivity <b>Objective:</b> To increase the productivity of livestock through implementation of an integrated programme dealing with nutrition and reproduction.	Diallo/TO Nutr
PAN/5/014 Improving Cattle Production and Quality Control for Monitoring of Animal Diseases <b>Objective:</b> To determine the effect of two zoonotic diseases (trypanosomiasis and fascioliasis) on reproduction and on the production of meat and milk in stockbreeding areas under the dual-purpose system using nuclear techniques.	Crowther/Viljoen
PER/5/027 Use of Nuclear Techniques to Improve Alpacas Productive and Reproductive Methods <b>Objective:</b> To improve reproduction performance of alpacas using nuclear and related techniques to recover and conserve the individual species.	Boettcher
PER/5/029 Genomics of the Alpaca: Identification of Expressed Genes and Genetic Markers Associated with Productivity and Embryonic Mortality (Not yet funded) <b>Objective:</b> To identify and characterize the factors associated with embryonic mortality in alpacas.	Malek/Boettcher
RAF/0/013 ICT-Based Training to Strengthen LDC Capacity <b>Objective:</b> To use new information and communication technology (ICT) for developing and delivering innovative learning/training modules to strengthen and expand the capacity in least developed countries (LDCs) to make use of specific nuclear technologies critically needed in key development projects/programmes supported by the Agency and other Technical Assistance or donor partners.	Crowther/Boettcher
RAF/5/054 Improvement of Livestock Productivity through an Integrated Application of Technologies (AFRA III-4) <b>Objective:</b> To develop and facilitate the application of appropriate selection criteria for genetically improved stock; to institute integrated management, nutrition, healthcare and follow-up practices for genetically improved stock; and to use modern reproductive techniques to improve productivity and reproductive efficiency of livestock in the region.	Boettcher/TO Nutr



**TC Project Description****TO**

- RAF/5/055 Support to African Union's Regional Programmes for Control and Eradication of Major Epizootics Viljoen/Lelenta  
**Objective:** To support within the framework of a strategic partnership with the African Union, the global effort of control and eradication of major trans-boundary animal diseases affecting livestock in the region led by the Inter-African Bureau for Animal Resources (AU/IBAR). This programme will aim at helping African countries to improve and produce livestock to ensure their role and participation in international markets that will lead to poverty alleviation and increased livelihoods. The specific objectives of the project are (i) to provide support to selected national veterinary laboratories to implement a quality assured disease control programme; (ii) to transfer appropriate and state-of-the-art technology to support diagnostic, surveillance and epidemiological activities relating to the control of major livestock diseases; and (iii) to support the establishment of a regional centre in Africa (Pan African Veterinary Vaccine Centre [PANVAC]) that would be responsible for (a) the production, assembly and distribution of diagnostic kits; (b) evaluating and monitoring the development of quality assured animal vaccines and (c) advising on the use of vaccines and vaccine strategies.
- RAS/5/041 Production of Foot and Mouth Disease Antigen and Antibody ELISA Reagent Kit (RCA) Crowther  
**Objective:** The overall objective is the control and eventual eradication of foot and mouth disease (FMD) in the East Asia and the Pacific region. The specific objectives are to produce enzyme-linked immunosorbent assay (ELISA) kits for antigen and antibody detection at a lower cost than currently commercially available for the diagnosis of FMD; and the development of the capability for diagnosing FMD using ELISA and molecular techniques by the FMD national laboratories in the region.
- RAS/5/044 Integrated Approach for Improving Livestock Production Utilizing Indigenous Resources and Conserving the Environment (RCA) Boettcher/TO Nutr  
**Objective:** To improve livestock productivity through better nutritional and reproduction strategies while conserving the environment. The specific objectives are to improve animal productivity and decrease discharges of selected greenhouse gases, (methane and carbon dioxide) and selected nutrients (nitrogen and phosphorus) into the environment; and to identify and adopt better breeding strategies that will improve animal productivity through the use of better selection criteria for offspring from cross-breeding programmes, optimum utilization of appropriate indigenous cows, benchmarking for growth and reproduction, and improving procedures for management, nutrition and health-care programmes in dairy farms.
- SIL/5/006 Improving the Productivity of N'dama Cattle Boettcher/TO Nutr  
**Objective:** To establish a national capability for the application of nuclear techniques to (i) assess the nutritional quality of locally available feed resources, and to develop optimal feeding strategies, (ii) evaluate the reproductive performance under different management and nutritional conditions, and improve artificial insemination (AI) services, and (iii) diagnose and determine epidemiological status of important diseases.
- SIL/5/010 Improving the Productivity of Ndama Cattle In Sierra Leone Boettcher/Viljoen/TO Nutr  
**Objective:** To strengthen the diagnostic capacity to monitor and control animal diseases affecting cattle, (ii) to apply feeding strategies and supplementation packages, and (iii) to produce hybrids with greater potential for increased growth rate and milk yields.

TC Project Description	TO
<p>SRL/5/041 Maximizing Productivity on Goat Farms through Cost-Cutting and DNA-Based Technology in Selection for Breeding (Not yet funded)</p> <p><b>Objective:</b> To improve the productivity of goats of small-holder farmers in Sri Lanka, by introducing new strategies such as supplementary feeding, improved management practices and disease control and by transferring genetic technologies to assist in proper selection of superior breeding animals.</p>	Boettcher/Viljoen
<p>SUD/5/028 Epidemiology and Control of Snail-borne Diseases in Irrigated Areas</p> <p><b>Objective:</b> The overall objectives of the project are to increase animal production, and maintain healthy and productive herds in irrigated areas by controlling snail-borne diseases.</p>	Unger
<p>SUD/5/029 The Characterization and Quality Assured Production of an Attenuated Theileria Annulata vaccine</p> <p><b>Objective:</b> To protect cattle against tropical theileriosis through vaccination in order to improve animal health and reduce reliance on acaricidal/pesticide tick control. More specifically, to establish quality-assured procedures and protocols for T. annulata cell culture vaccine production.</p>	Unger
<p>SUD/5/031 Setting up a National Network for the Control of Livestock Diseases that affect Exports</p> <p><b>Objective:</b> To establish capacity to diagnose Brucellosis in ruminants to improve food safety and secure animal exports.</p>	Unger
<p>TAD/5/003 Diagnosis and Control of Brucellosis in Cattle, Sheep and Goats (Not yet-funded)</p> <p><b>Objective:</b> To improve diagnosis of brucellosis in cattle, sheep and goats in order to prevent the spread of the disease among animals and the human population in Tajikistan.</p>	Crowther
<p>UGA/5/028 Improving the Capacity for Diagnostic of Animal Diseases</p> <p><b>Objective:</b> To strengthen the diagnostic capacity of the Diagnostics and Epidemiology Laboratory of the Ministry of Agriculture, Animal Industry and fisheries to monitor and control transboundary animal diseases of importance (e.g. CBPP, FMD, AI, Rabies, Brucellosis and RVF) to Uganda.</p>	Viljoen/Unger
<p>URT/5/025 Support for the Delivery of Artificial Insemination services</p> <p><b>Objective:</b> The sustainable intensification of milk and meat through the provision of efficient and reliable AI services.</p>	Boettcher
<p>YEM/5/006 Quality Management for Upgrading Animal Disease Control</p> <p><b>Objective:</b> To improve the management of diagnostic testing for livestock diseases in Yemen, leading to increased assurance of results in aiding control programmes.</p>	Crowther/Viljoen
<p>ZAI/5/015 Upgrading Laboratory Services for Diagnosis of Animal Diseases</p> <p><b>Objective:</b> Control and eradication of livestock transboundary diseases or other epizootics through the laboratory investigations using nuclear and related technologies.</p>	Unger
<p>ZAM/5/025 Development of Feeding Strategies for Smallholder Dairy Animals in Njolwe and Palabana Dairy Tenant Schemes</p> <p><b>Objective:</b> To improve household food security and income generation among small scale farmers through increased production and marketing of livestock by developing sustainable feeding and breeding strategies based on increased use of locally available resources.</p>	Boettcher

**TC Project Description**

ZIM/5/010 Improvement of Veterinary Diagnostic Laboratory Services

**Objective:** To enhance the capability of the Department of Veterinary Services (DVS) through the Central Veterinary Laboratory (CVL) in order to develop/adapt DNA-based diagnostic techniques for difficult to diagnose infections using conventional techniques; and to establish DNA/RNA-based molecular typing methods as epidemiological tools to study disease dissemination routes and sources of infection, and to characterize and differentiate between vaccine and field strains of diseases such as anthrax, rabies, and foot and mouth disease.

**TO**

Unger

# Publications

## Recently published

### Application of Radioimmunoassay in Improving the Reproductive Management of Smallholder Dairy Cattle

IAEA-TECDOC Series No. 1571, 2007, ISBN 978-92-0-107507-9



This publication was produced under an IAEA Technical Cooperation Project entitled 'Increasing and Improving Milk and Meat Production', that was implemented within the framework of the AFRA programme, with technical support of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture. It details the

results obtained by project counterparts from surveys taken and experiments performed in monitoring the reproductive performance of cattle and application of artificial insemination (AI) in the counterparts' respective countries. The publication is intended for livestock specialists involved in the management of reproductive services for cattle farmers in Africa, including those in ministries of agriculture/livestock, departments of livestock and veterinary services, and AI centres, and public and private veterinarians.

### Developing Methodologies for the Use of Polymerase Chain Reaction in the Diagnosis and Monitoring of Trypanosomiasis

IAEA-TECDOC-1559, June 2007, English



Trypanosomes produce a variety of diseases affecting both animals and man. Diagnosis has relied on conventional serological and microscopical methods whose sensitivity and specificity have never proven ideal. The Polymerase Chain Reaction (PCR) offers a solution to the detection of organisms since it has a very high sensitivity where

minute amounts of nucleic acid can be amplified. The specificity of PCR resides in the identification of specific parts of a genome. The work described in the publication involves main uses of PCR in the detection of trypano-

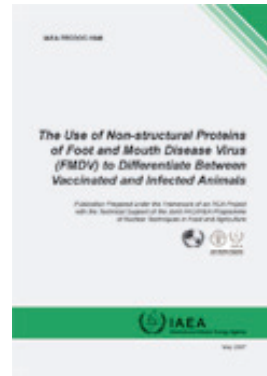
somes. Working protocols for the use of specific probes have been determined; handling and extraction of samples have been optimized; use of universal primers for the detection of all trypanosomes has been examined, all with promising results where validation criteria have been addressed. Such PCR-based tests allow an unequivocal estimation of the effect of interventions in the eradication of trypanosomal diseases, such as those involving the sterile insect technology (SIT) in the tsetse control programmes of the IAEA

### The Use of Non-structural Proteins of Foot and Mouth Disease Virus (FMDV) to Differentiate Between Vaccinated and Infected Animals

IAEA-TECDOC-1546, May 2007, English

The publication presents results of the Coordinated Research Project on the use of non-structural protein of foot-and-mouth disease virus to differentiate between vaccinated and infected animals.

This publication contains important cumulative information on the development of tests to measure antibodies produced against foot and mouth disease virus (FMDV) and to differentiate animals infected with foot and mouth disease (FMD) from those only given vaccines. During the last 10 years there has been a constant development of tests to attempt this and claims that have not always been substantiated with data. The coordinated research project (CRP) attempted to evaluate institutionally and then commercially derived tests to obtain validation data defining test performances from a wider geographical arena in laboratories of varying standards. The conclusions from the CRP will greatly add value to the current debate on the usefulness of such tests in the control of FMD in the face of vaccination at the herd and individual animal level.





## Improving the Reproductive Management of Dairy Cattle Subjected to Artificial Insemination



IAEA-TECDOC-1533, May 2007, English

This publication was produced as part of an IAEA Technical Cooperation Project. It details the results obtained by project counterparts from surveys taken and experiments performed in monitoring the reproductive performance of cattle and application of artificial insemination in the counterparts' respective countries.

This publication is intended for livestock specialists involved in the management of reproductive services for cattle farmers in Asia, including those in ministries of agriculture/livestock, departments of livestock and veterinary services, and artificial insemination centers, and public and private veterinarians

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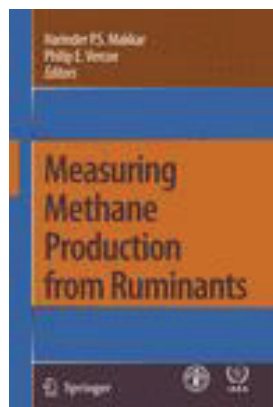
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## FAO/IAEA Manual on Measurement of Methane from Ruminants

Springer, ISBN 987-1-4020-6132-5, 2007

This book gives a comprehensive account of the methodologies for measuring methane from in vitro fermentation systems, and from stall-fed and grazing animals. The chapters have been contributed by experts in the field and methods and protocols have been presented in simple format for direct practical use.

A variety of techniques for measuring methane emissions ranging from radio and stable isotopic methods, respiration chambers to the tunnel method and sulphur hexafluoride tracer technique, which can be used with animals in the field have been covered. In vitro fermentation systems which provide the



opportunity to test new plants for their potential to reduce methane emissions and to help design new management and feeding strategies based on these measurements also form the subject of this book.

This book will equip the readers to measure and monitor methane emissions accurately and to meet the challenge of improving productivity from ruminants without damaging the environment. The techniques and procedures described are also relevant and adaptable to other anaerobic systems such as biogas plants, manure storage and application systems, sludge systems, etc.

This book can be ordered from the publisher <http://www.springer.com/dal/home/generic/search/results?SGWID=1-40109-22-173733690-0>. A limited number of complementary copies are available for libraries of institutes and universities upon request from the Animal Production and Health Section.

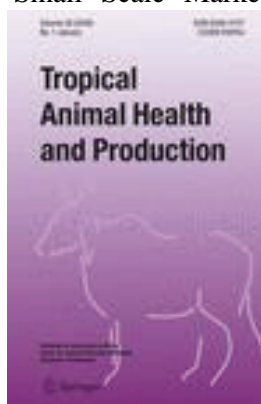
## Participatory Approaches for Evaluation of Small Holder Dairy Production

Tropical Animal Health and Production: Volume 39, Number 8 / December, 2007, 543-636

The Use of Participatory Approaches for Identifying and Prioritizing the Constraints to Productivity on Small-scale Market-oriented Dairy Systems

Guest Editors: David Whitaker, Paul J. Boettcher

It was produced under an IAEA Coordinated Research Project entitled "Integrated Approach for Improving Small Scale Market Oriented Dairy Systems", with



technical support of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture. It details the results obtained by project counterparts from Participatory Rural Appraisals made and Economic Opportunity Surveys performed in direct interaction with stakeholders. The publication presents both the theory and methodology of the PRA and EOS

and the result of case studies in which the two techniques were applied. The publication is intended for livestock specialists involved in the management of dairy production services for cattle farmers in Asia, including those in Ministries of Agriculture/Livestock, Departments of Livestock and Veterinary Services, AI centres, public and private veterinarians and consultants.

## In Press

## Formulation of Guidelines for Manure Management in Asian Livestock Production Systems for Achieving Agricultural Sustainability

A publication about developing guidelines for efficient manure management in Asian livestock production

systems is being prepared based on an Expert Meeting that was held under the IAEA/RCA Regional Technical Cooperation Project (RAS/5/044). The specific objectives of the nutrition component of the project are to improve animal productivity and decrease discharges of selected greenhouse gases (methane and carbon dioxide), and selected nutrients (nitrogen and phosphorus) into the environment. This publication is focussed on the management of nutrient waste component of the project.

Livestock manures and other agricultural waste products represent a valuable resource which, if used appropriately with a minimization of losses can replace significant amounts of fertilizer in areas with intensive livestock production. On the other hand, the large volumes of animal manure are not only a source of valuable plant nutrients but also a threat to aquifers and surface waters. As livestock production intensifies, there are serious concerns that poor management and use of manure could jeopardize the sustainability of the production system, because of environmental damage and disease transfer, and reduce productivity levels to well below their potential. In this publication, information about state-of-the-art manure management practices, current practices in Asia, amounts of manure produced and barriers to effective manure management is combined to provide guidelines for the development of a sustainable, environmental friendly and sanitary livestock production in Asia. It highlights the pressing need for holistic research into strategies and technology for management and treatment of manure, residues and wastes, which can ensure a sustainable use of nutrients and reduce environmental impacts, including odour and ammonia emissions, greenhouse gas emissions and the spread of diseases

## In Preparation

### Managing Prenatal Development to Enhance Livestock Productivity

The need for a book dealing with managing prenatal development to improve livestock productivity was identified during a Consultants meeting on Research Needs for Improvement of Livestock Productivity in Developing Countries Through Manipulation of Nutrition in utero, held in October 2005.

There is a growing demand worldwide for livestock products and the role of developing countries in meeting this demand will increase. Within this, the current production systems will come under increasing pressure because of the access to feed resources and other environmental challenges. The reproductive female will be under the most pressure in the future because she will be expected to reproduce consistently, and at the very least, annually. The female will also face nutritional and other environmental challenges in meeting the developmental needs of the embryo and foetus throughout gestation and in the preweaning

period. Therefore, the foetus is exposed to various challenges that are mostly, but not exclusively, of a nutritional nature. The question is whether these challenges impact on foetal development and subsequent health, growth, reproductive and lactational characteristics of the offspring.

The objectives of this book are to provide a quantitative assessment of the role of, and current state of understanding of the mechanistic basis to, environmental plasticity in producing healthy and productive livestock. The book will contain review papers covering all the key livestock species as well as chapters covering relevant information on non-livestock species.

### Instant Testing and Reporting Systems

A paper is to be submitted on Instant Testing and Reporting Systems to the OIE. The Joint Division is actively supporting the system which comprises highly mobile rugged and operator fool proof devices to perform diagnostics with defined diagnostic specificities and sensitivities which can instantly send results back from the field to a central control point. In this way real time diagnosis can be made. The devices use variants of the PCR and instant extraction and analysis of samples, thereby avoiding the problems of sample storage and transport- often the most damaging feature to molecular tests. The system is at the heart of the CRP D3. 20.25 involving the rapid diagnosis of Avian Influenza. The devices will be validated in reference laboratories and then in the field. Such systems offer the way forward to improving early warning of disease spread and should revolutionise diagnosis in developed and developing countries.

### 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 John Crowther at [j.crowther@iaea.org](mailto:j.crowther@iaea.org) for further information.

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-naweb.iaea.org/nafa/aph/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. Please send an email to [mailserv@mailserv.fao.org](mailto: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-naweb.iaea.org/nafa/aph/index.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-naweb.iaea.org/nafa/aph/public/d3\\_pbl\\_1\\_10.html](http://www-naweb.iaea.org/nafa/aph/public/d3_pbl_1_10.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 Programme of Nuclear Techniques in Food and Agriculture. This package is also available as a CD ROM for users who have no access to internet connection.



**IAEA**

International Atomic Energy Agency

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