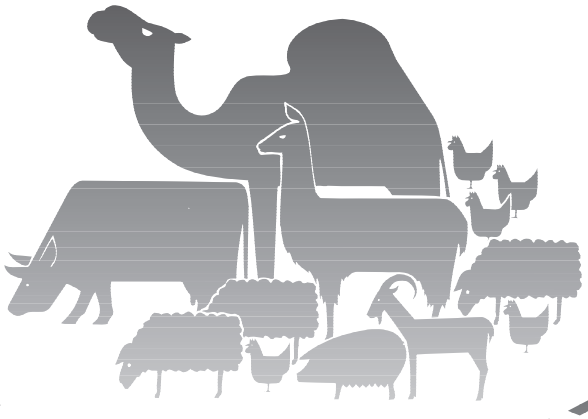
ANIMAL PRODUCTION AND HEALTH NEWSLETTER



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

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TO THE READER

Dear Colleague,

As we approach 1999 and a new IAEA programme biennium begins we see the establishment of some 25 new IAEA Technical Co-operation Projects (TCPs) and the start of five additional FAO/IAEA Co-ordinated Research Projects (CRPs). This is on top of the existing batch of some 12 IAEA TCPs that will carry on into 1999 and the six on-going CRPs. Linked to these activities will be some 12 meetings (workshops, training courses and research co-ordination meetings) during next year.

What will continue, what is new and what will be significantly different in 1999? In overall terms, we will continue what was started some two years ago after the external review of the Animal Production and Health Sub-programme with a strong focus on problem solving rather than capacity building through our CRPs and within TCPs, an emphasis towards creating sustainability and real impact.

In the animal production area this means continuing to identify locally available feed resources and developing balanced diets to maximize the use of these. We thus have, for example, a new CRP looking at the effects of tannins in an effort to introduce tanniniferous plants into such diets and we have a follow-on CRP on purines focusing on how best to determine the contribution of the rumen microflora for balancing livestock dietary needs. In terms of support through TCPs in animal productivity, the focus remains on assisting countries to further develop these diets, determine delivery systems such as the use of urea molasses multi-nutrient blocks and to complete the process of regionalization of RIA kit production to ensure sustainability and availability of reagents.

In animal health, we continue to focus on the FAO EMPRES diseases (rinderpest, foot–and–mouth disease (FMD) and contagious bovine pleuropneumonia) linking ourselves to on-going control and eradication programmes through developing, validating, standardizing and distributing kits and reagents (ELISA and PCR) for disease diagnosis and surveillance. In the case of FMD, a new CRP will commence in 1999 concerned with developing assays to separate vaccinated from naturally infected animals. Support continues for trypanosomosis control and eradication efforts through the development and validation of an antibody ELISA and the introduction of a GIS component to surveillance work. In recognizing the importance of poultry in small holder farming systems, a new CRP will look at existing and potentially new ways of Newcastle disease vaccine delivery at the village level through using the ELISA to monitor responses in the bird.

In providing support to the FAO/IAEA Food Quality Training and Reference Centre initiative started in 1998 by the Joint Division, this Sub-programme has been concerned with assistance for veterinary drug residue monitoring. This will continue in 1999 with the initiation of a new CRP to validate and standardize testing procedures for antibiotic residues in livestock and livestock products, and the number of TCPs in this area has doubled.

But let me now focus on some newer ideas being developed. In animal production, we are developing ideas for a new CRP that will involve a holistic approach to studying interventions. Whilst we appreciate that at any one location, one or more factors may be important and the most appropriate intervention may vary between sites, overall impact measurement will be the same. This should enable us to show the benefits of tackling all three aspects, rather than one, in any given situation.

On a slightly different note, the near completion of the CRP looking at constraints in the delivery of artificial insemination services has clearly highlighted problem areas. A number of new TCPs will be assisting Member States in taking remedial action to improve this service and provide an opportunity for livestock owners to maximize on the potential of cross-breed animals.

In animal health two major innovations are currently taking place within the Global Rinderpest Eradication Programme (GREP). One involves the introduction and use of performance indicators to assist national veterinary services ascertain that their surveillance systems can detect rinderpest if it was present. Developed during the past twelve months and involving considerable dialogue with counterparts, these indicators will be introduced into national rinderpest eradication programmes. Equally interesting is the development of an entirely new strategy for the elimination of rinderpest from the remaining foci in the world. Based around a concept of 'seek and destroy', a meeting will be held in early 1999 to formalize this approach and identify the resources needed to make it work. It is foreseen that this extra effort in the remaining infected areas is essential if we are to achieve the overall goal of rinderpest eradication by the year 2010. Interestingly both approaches were used by WHO in tackling smallpox eradication ('seek and destroy' strategy) and in the current polio eradication effort (Performance Indicators).

Support through our existing External Quality Assurance programme will continue and grow in 1999 but particularly exciting is the consideration by the OIE of a Generic Veterinary Laboratory Accreditation scheme. Built around concepts that were developed during an FAO/IAEA consultants meeting earlier in 1998, it is likely to offer many developing country veterinary laboratories a chance to become internationally accredited — a likely prerequisite to meeting future testing requirements for international trade in livestock and livestock products. If this generic plan is adopted by the OIE, we will certainly provide what support we can for national veterinary laboratories involved in our projects to move towards achieving such accreditation.

Finally, in looking at new initiatives, and something I have highlighted in previous Newsletters, we are striving to bring business management and more transparency and accountability into all that we do. Every project now has a detailed work plan linked to a logical framework and we are introducing systems of planning, monitoring and evaluation into all activities. We are also currently working closely with our FAO colleagues in Rome to develop a clear strategy plan which should provide Member States with concise information of the direction being taken in the next five to seven years.

Further details on all these activities are contained in this Newsletter, but before finishing, I would like to draw your attention to a few staff changes within the Sub-programme. Regrettably we had to say goodbye to Singh Nanda (who has returned to his University in India) and to Thomas Ndegwa (who has gone to assist the Government of Zimbabwe with GIS). Both staff members contributed significantly to our activities. Soon, we will be saying goodbye to Bill Goodger who has been with us for one year as a sabbatical. His presence has been immensely stimulating and he is the 'brains' behind the holistic CRP concepts. Finally, although not leaving in the full sense, Roland Geiger has been transferred to PARC Headquarters, Nairobi, to continue assisting the rinderpest eradication programme in Africa. To all of you, many thanks for all your help and loyalty and I wish you all the very best for the future.

Fortunately, our team has some new members! Firstly, I would like to welcome Roswitha Schellander who has taken over from our senior office clerk, Camilla Odinius, and I trust will stay as long as Camilla did! We can also welcome Dr. Harinder Makkar as a new Technical Officer overseeing the programme in animal nutrition. Dr. Makkar has a worldwide reputation and extensive publications in this field and will without doubt contribute greatly to this programme. We have also been joined by a further two professional officers, Dr. Bernadette Abela from Malta who will assist us with the animal health programme for six months, and Dr. Anita Erkelens who is supported under the Government of Netherlands trypanosomosis CRP and will provide continuing support for GIS. Finally, we welcome Dr. Helder Louvandini, from Brazil, an IAEA Junior Professional Officer, who will assist the Sub-programme within the Laboratory Unit.

As 1998 draws to a close, may I on behalf of everyone in the Animal Production and Health Sub-programme wish you seasonal greetings and all the very best in 1999.

With best wishes,

Martyn Jeggo
Head, Animal Production and
Health Section

A. STAFF

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Ron Dwinger	Technical Officer
Harinder Makkar	Technical Officer (starting in January 1999)
Oswin Perera	Technical Officer
Anita Erkelens	Associate Professional Officer
Andrea Gervelmeyer	Associate Professional Officer
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Roland Geiger	Technical Officer (Outposted to Kenya)

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B. FORTHCOMING EVENTS

Review and Planning Workshop for the Asia/Pacific Region on "Feed Supplementation Strategies and Reproductive Management of Cattle" (RAS/5/030 and RAS/5/035)

Technical Officer: Oswin Perera

This Workshop will be held under the framework of the Regional Co-operative Agreement for the Asia and Pacific Region (RCA) from 11 to 15 January 1999 in Yangon, Myanmar. Its objectives are:

- to assess the progress made by participating Member States in the formulation, testing and field application of feed supplementation strategies for improving cattle production;
- to discuss the applications of progesterone RIA for monitoring reproductive performance of cattle and for improving the efficiency of AI services;
- to provide training in the use of a standardized database for recording, analysing and interpreting field and laboratory data; and
- to formulate work plans for future activities to extend the field applications of supplementation strategies, improve reproductive management and increase the efficiency of AI services.

First Research Co-ordination Meeting (RCM) on "Assessment of the Effectiveness of Vaccination Strategies against Newcastle Disease and Gumboro Disease Using Immunoassay-based Technologies for Increasing Farmyard Poultry Production in Africa" (D3.20.19)

Technical Officer: Ron Dwinger

The RCM will be held from 8 to 12 February 1999 in Rabat, Morocco.

The purpose of the meeting is to prepare work plans for the first year of this CRP which will involve the vaccination of rural poultry flocks against Newcastle disease and the application of a commercially available ELISA for monitoring the immune response and protection levels in the birds.

Approximately 12 scientists from various African States as well as experts from Nigeria, Denmark, Morocco, the Netherlands and a representative from the Joint FAO/IAEA Division are expected to attend the meeting.

Project Co-ordination Meeting and Mid-Term Review of AFRA Project II–17 – "Development and Field Evaluation of Animal Feed Supplementation Packages" (RAF/5/041)

Technical Officer: Harinder Makkar

This Workshop will be held under the framework of the African Regional Co-operative Agreement from 8 to 12 February 1999 in Antananarivo, Madagascar. Its objectives are to assess the progress made by participating Member States in the formulation, testing and field application of feed supplementation strategies and the establishment of the 'Self-coating RIA' technique for progesterone measurement for improving cattle production. It will also formulate work plans for future activities.

Final RCM on "Use of Immunoassay Technologies for the Diagnosis and Control of Foot–and–Mouth Disease in South East Asia" (D3.20.14)

Technical Officer: Martyn Jeggo

The final RCM will be held from 22 to 26 February 1999 in Phnom Penh, Cambodia. The purpose of the meeting is to bring together results from studies undertaken on foot–and–mouth disease (FMD) in countries in the region to assist in the development of a

regional strategy for control and eventual eradication of FMD.

Approximately 13 scientists from Bangladesh, Cambodia, the People's Republic of China, Laos, Malaysia, Myanmar, New Zealand, the Philippines, Sri Lanka, Thailand, the United Kingdom, Vietnam as well as a representative from the Joint FAO/IAEA Division are expected to attend the meeting.

The meeting is to be held jointly with the Fifth Meeting of the OIE Sub-Commission for FMD in South-East Asia at the Sunway Hotel Phnom Penh.

Second RCM on "Rinderpest Sero-monitoring and Surveillance in Africa Using Imunoassay Technologies" (D3.20.16)

Technical Officer: Andrea Gervelmeyer

The second RCM of the CRP will be organised in Addis Ababa, Ethiopia, from 22 to 26 February 1999. It will be held at the same time and venue as the PARC Co-ordination meeting for East Africa. The 20 Research Contract holders will be invited together with the two Research Agreement holders and are expected to present the results of their sero-monitoring and surveillance activities. Reports should be prepared in electronic form on a floppy disk formatted as a manuscript for an IAEA TECDOC. ELISA results should be brought to the meeting on floppy disk stored as EDI–files.

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

Technical Officer: Harinder Makkar

The first RCM is scheduled from 8 to 12 March 1999 in Vienna, Austria, and will involve the six Research Contract holders and four Research Agreement holders. Work plans for the coming year will be developed at this meeting.

Final RCM on "Use of RIA and Related Techniques to Identify Ways of Improving Artificial Insemination Programmes for Cattle Reared Under Tropical and Sub-tropical Conditions" (D3.10.20)

Technical Officer: Oswin Perera

This CRP is now nearing completion and the final RCM will take place from 10 to 14 May 1999 in Uppsala, Sweden. The purpose of the meeting is to review the results obtained over the five–year duration of the project and to prepare a scientific publication based on the papers presented.

Approximately 20 scientists from Argentina, Australia, Bangladesh, Chile, Costa Rica, Cuba, Indonesia, Mexico, Myanmar, Pakistan, People's Republic of China, Peru, Sri Lanka, Sweden, USA, Uruguay, Venezuela, Vietnam, as well as a representative from the Joint FAO/IAEA Division are expected to attend the meeting.

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

Technical Officer: John Crowther

The meeting will be held from 17 to 21 May 1999 in Onderstepoort, South Africa.

The purpose of the meeting is to review work done under this CRP in the areas of PCR aiding the diagnosis of rinderpest, peste des petits ruminants (PPR) and contagious bovine and caprine pleuropneumonia, to formulate

research plans for the coming year and to receive information on the latest developments in molecular techniques.

The meeting will be attended by Research Contract holders from Ethiopia, Senegal, Mali, Côte d'Ivoire, Turkey, Namibia and Kenya, as well as Research Agreement holders from UK, South Africa, Sweden and France.

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

Technical Officer: Andrea Gervelmeyer

The second RCM of the CRP will be organized in Nairobi, Kenya, from 13 to 16 September 1999. The 11 Research Contract holders will be invited to present the results of their field validation of a competitive ELISA to detect antibodies directed against *Mycoplasma mycoides mycoides sc*. Reports should be prepared in electronic form. ELISA results should be brought to the meeting on floppy disk stored as EDI–files together with hard copies of the questionnaires.

FAO/IAEA/OAU Workshop on Disease Surveillance and Disease Mapping in Connection with PARC (RAF/5/043)

Technical Officer: Andrea Gervelmeyer

The Workshop will take place from 4 to 8 October 1999 in Nairobi, Kenya.

The course will be held in English only.

Deadline for Nominations is 1 March 1999.

The Workshop is open to 15 participants from developing Member States of FAO and IAEA from Africa which are involved in disease surveillance as part of the Pan African Rinderpest Campaign (PARC). The Workshop will focus on epidemiologists responsible for the national epidemiosurveillance networks which are established as part of PARC.

The participation is subject to the availability of appropriate results from national rinderpest surveillance programmes which should be submitted with the course application.

Rinderpest is eradicated from most parts of Africa and efforts focus now to ensure that no residual foci of infection are left in West Africa and to identify the remaining foci of infection in the endemic areas of East Africa.

Epidemiosurveillance networks are being established at the national level to carry out disease surveillance. The evaluation and presentation of these results is a critical component in the decision making process of animal disease control programmes.

The Workshop will provide training in data management and evaluation of epidemiological data produced in connection with the surveillance of rinderpest. The participants will be familiarized with concepts of disease mapping and the application of the related software programs.

Emphasis will be put on the evaluation of ELISA related data using EDI.

The Workshop will be a combination of lectures, demonstrations and practicals. For the practical sessions, the participants will be asked to provide the relevant data from their own national disease control and eradication programmes.

IAEA/FAO/Regional Training Course on "The Diagnosis and Control of Foot–and–Mouth Disease" (RAS/5/033)

Technical Officer: John Crowther

The training course will take place from 1 to 26 November 1999 at the Foot–and–Mouth Disease Centre, Pakchong, Nakhonratchasima, Thailand.

The course will be held in English only and is organized by IAEA and FAO in co-operation with the Government of Thailand.

The training course is open to 16 participants from developing Member States of FAO and IAEA in South East Asia.

Deadline for Nominations is 1 August 1999.

Background of the course:
Foot–and–mouth disease (FMD) is a major constraint on livestock in South East Asian countries. The rapid identification of the disease, estimation of immunity levels in herds, vaccination and movement restriction of livestock are vital to effective control. The major laboratory methods involve both serological and increasingly molecular biological techniques. The serological tests in common practice now focus mainly on enzyme–linked immunosorbent assay (ELISA) and kits for antigen detection and antibody estimation have been supported through Agency activities over a number of years. External quality assurance and internal quality control have also been developed for these kits to allow greater confidence in results from individual laboratories. Recent advances in polymerase chain reaction (PCR) have been exploited in FMD to allow expression of genes as proteins for diagnostic uses and for rapid sequencing and unequivocal identification of FMD virus isolates.

This course comprises lectures, practices and demonstrations to cover all aspects of diagnostic methods involved in the detection and differentiation of FMD virus and measurement of antibodies against the virus. These will focus on the use of ELISA emphasizing the benefits of the test but comparing results to other 'conventional' methods. Use of the PCR technologies and sequencing will also be demonstrated. The fundamentals of vaccination and control of FMD will be examined as well as epidemiological aspects of the disease from a South East Asian and world-wide perspective. Good laboratory practice (GLP), external quality assurance (EQA) and internal quality control (IQC) will also be examined. The course is intended to provide an overall view of FMD both from the applied and on-going research areas.

Participants qualifications:
Experienced scientists and veterinarians directly involved in control of FMD. Participants must have basic training and experience in the laboratory.

General Information for Training Courses/Workshops

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

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

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

Administrative and financial arrangements:
Nominating Governments will be informed in due course of the names of the candidates who have been selected and will at that time be

given full details on the procedures to be followed with regard to administrative and financial matters.

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

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

C. PAST EVENTS

Regional Model Project RAW/5/004 "Support for Rinderpest Surveillance in West Asia"

The conclusions and recommendations of the Fourth Co-ordination Meeting of RAW/5/004 held in Sanaa, Yemen, from 11 to 15 May 1998 are shown below.

The meeting agreed on the comprehensive accomplishments under the present project which refer to the transfer of technology, facilitating co-operation and exchange of information, provision of equipment and chemicals, elaboration of specific recommendations and advice on policy towards eradication of disease and declaration of the rinderpest free zone. In detail, the following points were addressed:

- regional co-ordination of activities
- identification of the problems
- transfer of technology
- facilitating contacts between the specialists of the region
- provision of equipment and chemicals, in support of national laboratories
- formulation of regional and country specific recommendations regarding feasibility study, policy, OIE pathway, declaration of freedom from disease on national and sub-regional basis.

There was a general agreement that the data provided from surveys and laboratory examinations clearly indicated that, for most countries, cessation of vaccination was a realistic option in the very near future. All the countries concluded that the concept of regional co-operation, allowing the unique and efficient co-ordinated approach, should be continued until all the region went into a proper surveillance phase. They also indicated that the region was at a very critical phase in the control of disease and that interest from national governments needed to be stimulated. The role of the project was considered crucial to provide this impetus, a view strongly upheld by the FAO representative. In particular, the following specific conclusions were reached:

1. The representatives confirmed their commitment to the global eradication of rinderpest and indicated that co-ordination through the Regional Model Project, served as an excellent and unique forum for data exchange, and stimulation and co-ordination of optimal management strategies.

2. The meeting recognized several specific possibilities for bi-regional co-operation, fostered through data furnished from RAW/5/004. An example is the inclusion of Turkey into RAW/5/004, where rinderpest is of national concern. They concluded that both IAEA and FAO should actively promote cessation of vaccination by targeting countries at the ministerial level with support from counterparts involved in RAW/5/004.

3. The meeting concluded that the project had been, and was still, vital to efforts in the control of rinderpest in the region. The capability for rinderpest surveillance has been achieved in Iran, Syria, Yemen, Jordan, Lebanon, Uzbekistan, Saudi Arabia and Turkey and will be available in Iraq in the near future. Jordan and Lebanon can now begin the OIE pathway leading to declaration of freedom from disease based on the support given through the project. The meeting stressed that a central role for the Agency was highly recommended. To guarantee sustainability after 1998, it is essential that countries seek national support for surveillance efforts.

4. The meeting concluded that countries should re-examine their policy on vaccination and formulate new strategies based on risk/benefit analysis considering the current global rinderpest situation. It was concluded that the continued use of mass-vaccination was contra-indicated and should be discouraged. It was recommended that there should be a more concerted effort to stimulate national authorities to evolve a proper understanding of risk assessment and that this should be linked to efforts at improving contingency planning.

5. The meeting indicated that all countries in the region, including those outside the project, should be consulted in the context of the trans-boundary nature of rinderpest and that strategies and results should be made available to allow co-ordination and standardization of efforts. It was recommended that a mechanism to facilitate this be explored. The meeting concluded that Pakistan is a vital area for rinderpest dissemination and that this poses a threat to other countries in the region.

6. The meeting concluded that Iran played a vital role on preventing spread of disease into the rest of the West Asian countries and that this effort should be sustained, particularly at a time when the elimination of disease in Pakistan is proving difficult.

7. The meeting concluded that support for Uzbekistan was merited and recognized its possible role in ensuring disease was not spread.

8. The meeting concluded that although the project had gone a long way in facilitating national laboratories conduct sero-monitoring and surveillance, assistance was still needed to strengthen disease surveillance to allow cessation of vaccination, at both at the laboratory level and in terms of field services and through the development of emergency preparedness. They concluded that the approaches taken through RAW/5/004 have been successful but are still required to promote and guide regional eradication programmes, particularly with the unique problems faced in West Asian countries.

Recommendations

1. The meeting recommended that the message of cessation of vaccination be taken to higher levels (National Ministries), substantiated by the regional data collected from RAW/5/004. It was also recommended that both FAO and IAEA became active in this area.

(a) The meeting recommended that Agricultural Ministers from Lebanon, Jordan and Syria discuss trans-boundary control of rinderpest and cessation of vaccination to allow OIE Provisional Declarations of Freedom from rinderpest as soon as possible. A joint mission of FAO/IAEA representatives to each country should facilitate such an agreement.

(b) The meeting recommended that the United Arab Emirates and Kuwait be actively encouraged to cease vaccination and provide data to substantiate this argument. The meeting also recommended that Oman should become involved through an FAO TC project.

(c) The meeting supported the establishment of an IAEA TC project in Yemen to improve disease surveillance, as well as more commitment from national authorities responsible for disease control, to fund eradication.

(d) The meeting concluded that the area of endemic rinderpest in northern Iraq/south eastern Turkey/north western Iran was a potential threat to the whole region. The meeting recommended that a rapid assessment of the area was made and that control measures be instigated as soon as possible.

Final RCM on "Development, Standardization and Validation of Nuclear-related Technologies for Measuring Microbial Protein Supply in Ruminant Livestock for Improving Productivity" (D3.10.21)

This RCM was held from 24 to 28 August 1998 at the VIC, Vienna, Austria.

OVERALL CONCLUSIONS

1. Phase I of the programme (1996–1998) has been successfully completed.

2. The CRP has re-affirmed that the purine derivates (PD) excretion technique continues to show its potential value as a simple, easy–to–use and scientifically valid method for predicting the rumen microbial protein supply in ruminant livestock. It is therefore a powerful technique which is now being increasingly used for research purposes. In comparison with other methods, the PD method is non-invasive and inexpensive to use, yet provides a sensitive indication of the rate of outflow of microbial protein from the rumen.

3. The development of standardized methodologies and procedures contained in the Laboratory Manual (IAEA–TECDOC–945), has been very useful for undertaking the development of models for using urinary purine derivatives to predict microbial supply from the rumen. The manual has been successfully used in generating regional research that could be centrally evaluated during the RCM.

4. Some of the Phase I technique-related research has been published in scientific journals (e.g. Martin-Orue, S.M., Balcells, J, Zakraoui, F and Castrillo, C, Anim. Feed Sci. Tech. **71** (1998) 269–282; Chen, X.B., Calder, A.G., Prasitkusol, P., Kyle, D.J., Jayasuriya, M.C.N. J. Mass Spec. **33** (1998) 130–137; Chen, X.B., Jayasuriya, M.C.N., Br. Soc. Anim. Sci. 1998 (in press).

SPECIFIC CONCLUSIONS

The following conclusions are related to the four areas of activity investigated under this CRP.

1. The response in PD excretion to microbial protein supply due to different levels of feed intake

Studies were carried out with *Bos indicus*, *Bos taurus* and *Bibos banteng* (Bali) cattle and swamp buffaloes. The species included were: Kedah-Kelantan (KK) cattle and swamp buffaloes (Malaysia), Bali and Ongole cattle (Indonesia), Zebu cross (Venezuela), black indigenous cattle (Turkey). Results showed that there was a linear increase in PD excretion with increasing levels of feed intake in all species at all locations, verifying the value of PD excretion as a predictor of microbial purine outflow from the rumen. The slopes of these relationships reconfirmed that there were different responses between species probably due to different partitioning of PD removal from the blood by renal and non-renal routes. Studies using ^{14}C or ^{15}N labelled uric acid in Indonesia, Turkey, Malaysia and Venezuela showed that recoveries of labelled PD in urine were 80–85% and hence non-renal losses were 15–20%.

Responses in PD excretion to increasing levels of feed intake have been obtained in different laboratories where circumstances allowed, but the calibrations have not been fully established for all species. Additional calibrations are needed to be undertaken to ensure that current models developed during Phase I are appropriate for different types of ruminant livestock under a wider range of environmental conditions, e.g. types of feeds and different climates.

2. Determination of endogenous PD excretion

The levels of PD excretion were determined in fasting animals in order to determine the endogenous level of PD excretion and PD:creatinine ratio that existed when no microbial purines were flowing out of the rumen. Rates of endogenous excretion have now been established with confidence for buffaloes, *Bos taurus* and *Bos indicus* cattle and sheep under this CRP.

3. Estimation of purine N:total N ratio in rumen microbes

Methods for estimating rumen microbial protein or N outflow using PD excretion rate rely on the knowledge of the ratio of purine N:total N in microbial material leaving the rumen. The ratios obtained during Phase I (e.g. in Zebu cattle 12.2% SE ± 1.25) were relatively constant, unaffected by diet and within the range reported in the literature. It is concluded that the value previously recommended (11.6%) is sufficiently consistent to be applied in most situations except when:

Concentrate: roughage ratios in the diet > 0.5–0.6 and when protozoa represent a major fraction of the microbial material in duodenal digesta.

Although existing information indicates that particle-associated (PA) bacteria contribute significantly to the duodenal flow, the low recovery of the bacterial isolates obtained in the studies made in Phase I (only 19% SD ± 0.69 (^{15}N) and 20.1% SD ± 5.39 (PA) of the original adherent microorganisms were released) shows that there is no need for changing the original protocol.

4. Enzyme profile studies

The aim of obtaining enzyme profiles of individual animal species was successfully completed. Xanthine oxidase (XO) was determined in the gut, liver and blood of buffaloes and cattle. The results show a difference in the xanthine oxidase activity in different tissues and can justify the use of different values for endogenous excretion of PD and urinary recovery in the prediction equations for different species. The patterns of XO enzyme activity in different tissues in these species confirm results obtained previously. An interesting finding was that Bali cattle had extremely low xanthine oxidase activity in the intestinal tissues. However, this finding needs to be reconfirmed because of the uniqueness of the results.

5. Renal and non-renal excretion of purine derivatives

Excretion of PD by renal and non-renal routes has been successfully evaluated by using both ^{14}C and ^{15}N tracers. The results have been used to refine the models for predicting microbial flow into the small intestine from urinary PD excretion rate. Estimates of glomerular filtration rate (GFR) based on U:P (urine:plasma) ratios of creatinine have shown that this parameter is also related to the level of feed intake, providing reasons for the different ratios of partitioning of PD between renal and non-renal routes.

Preliminary models have been developed for all species based on the recovery of labelled PD (nuclear technique) and the measures of endogenous excretion.

For buffaloes:
$y = 0.74\ X + 0.337\ W^{0.75}$

For KK cattle
$y = 0.68\ X + 0.275\ W^{0.75}$

For Zebu crosses
$y = 0.84\ X + 0.236\ W^{0.75}$
$y = 0.85X + 0.132\ W^{0.75}$ (Ongole)

For Bali cattle
$y = 0.86\ X + 0.145\ W^{0.75}$

where
y = PD excretion (mmol/day),
X = absorbed purine bases (mmol/day) and
W = live weight (kg).

By applying the model equations, and allowing for the purine-N:total N ratio in rumen microorganisms, the total microbial outflow from the rumen was predicted. When microbial flow was predicted at different levels of feed intake, the corresponding microbial flow estimates per unit of digestible organic matter intake (DOMI) were within the expected range found in the literature. The new knowledge concerning endogenous excretion helps to improve the confidence in the prediction models developed during the 2nd RCM. However, uncertainty about the purine N:total N ratio and in the estimation of the tracer recovery at only two levels need be taken into consideration when using the prediction models. Further work in established laboratories (Malaysia and Indonesia) will undoubtedly improve the level of confidence in prediction of the absolute levels of microbial flow. The method can, however, now be used with confidence in the field for comparing the microbial flows between diets or across different environmental or other treatments.

Knowledge of endogenous excretion can also be used as a diagnostic aid. For example, animals with a endogenous excretion similar to, or only slightly above the endogenous value established for their species will have a dysfunctional rumen or are simply not eating adequately which requires adjustment to the feeding management.

RECOMMENDATIONS

To FAO and IAEA:

1. Results of the Phase I should be published as an IAEA TECDOC.

2. Phase II of the CRP should be initiated as soon as possible.

3. The Technical Contract and the Laboratory Manual (IAEA–TECDOC–945) proved highly valuable to all participants of the CRP and other researchers using purine derivative technique for estimating rumen microbial protein supply.

4. The technique is now ready for use under field conditions and should be evaluated in various developing countries in different regions and under different livestock production systems. The following countries fit these criteria and the new Research Contract holders should be selected from these countries. China, Vietnam, Thailand, Malaysia, Indonesia, Sri Lanka, India, Venezuela, Argentina, Mexico, Zimbabwe, Namibia, Tunisia and Turkey.

5. The current Research Agreement holders should continue into Phase II to provide a level of continuity to the programme because of the effective links that have already been established.

6. One difficulty identified during the 2nd RCM was the break in the administrative processes in the IAEA during the latter part of Phase I due to changes in staffing in the Animal Production and Health Sub-programme. An experienced officer, with wide knowledge of RCMs and the technical and administrative requirements has been available to assist with the completion of Phase I. He has wide experience with the background to this project and understanding of the role of the PD technique. His continuing involvement in Phase II of the project is highly desirable and he should be invited to join the second phase of the CRP as a Research Agreement holder.

7. To continue the impetus of the programme, it is desirable to award the new Research Contracts as soon as possible. There is a need for clarification of the base data in the field locations for a short period after which the next RCM should be held (in early 2000). The Research Agreement holders and the Research Contract holders from Malaysia and Indonesia should continue with tracer studies.

8. It will be invaluable for current Research Agreement holders to travel to countries of the new Research Contract holders in the initial stages of Phase II to establish good linkages and assist in the development of their work programmes.

9. Provision should be made to enable the programme to be extended for a further 1–1.5 years, beyond the year 2000, to achieve a full evaluation of the potential impact of the PD technology and to complete the process of establishing the protocols for effective use of the colorimetric technique by extension personnel. The Final RCM should be held towards the end of 2001.

10. An assessment of the impact of these techniques in the field is essential. A procedure for this assessment should be developed at the next RCM in early 2000.

11. The colorimetric method for estimation of concentration of PDs requires only the availability of a UV/visible spectrometer and basic animal management facilities in each location. However, it will be highly desirable to ensure that all analyses are carried out according to already standardized and validated protocols (IAEA–TECDOC–945) and using appropriate standards in order to provide accurate results at all locations.

12. The distribution of standards from a central location (the FAO/IAEA Agriculture and Biotechnology Laboratory, Seibersdorf) that can be used locally by participants for quality control is recommended. An Agreement holder should be invited to prepare a short document describing the procedures required to ensure quality assurance.

To Research Contract holders of Phase I who will continue into Phase II of the CRP:

1. The models developed should be put into use for those species for which the models were successfully validated in Phase I.

2. The determination of the relationship between the microbial flow and PD excretion had not been completed at the time of the previous RCM. Now that this work has been completed, the technique using the procedures developed under the Technical Contract (7722/RB/TC) should be used after validation under local conditions.

3. Contracting institutions in Malaysia and Indonesia should carry out additional tracer studies on different types of livestock (e.g. cross-bred cattle and/or buffaloes) and 4 levels of intake ensuring that ad libitum intake defined as "voluntary intake" (see IAEA–TECDOC–945) accounts for at least 50g DDM/kg $W^{0.75}$ (or 2% live weight). The diet used should be of good quality with adequate N and minerals.

To new Research Contract holders:

1. Controlled feeding experiments should be undertaken by new Research Contract holders in their own regions to verify the techniques in their own setting. They should also determine the existing base level of nutritional adequacy so that the impact of the new technology in their regions can be measured. It will be important to determine whether the use of the new technique results in the improvement in the efficiency of the use of locally available feed resources.

2. Work plans and experimental protocols were developed during the 2nd RCM for new Research Contract holders joining the programme. They should strictly adhere to these whilst following the standardized experimental methodologies provided in the IAEA Laboratory Manual (IAEA–TECDOC–945).

To all Research Contract holders:

1. The colorimetric techniques used for estimating uric acid, allantoin and creatinine concentrations in urine should be evaluated for field or 'on-farm' use as a simple indicator of the 'nutritional status' of animals. The final objective should be the provision of a method which can readily be used by farmer advisors or extension workers to identify major problems of nutrition that result in a grossly inefficient rumen digestion of feed and a low level of microbial supply to the host animal.

Final RCM on "Development of Feed Supplementation Strategies for Improving the Productivity of Dairy Cattle on Smallholder Farms in Africa" (D3.10.19)

This RCM was held from 7 to 11 September 1998 at the VIC, Vienna, Austria.

MOST RELEVANT RESULTS

1. All countries observed long inter-calving intervals and long anoestrus periods after calving in animals investigated in Phase I of the project. Body condition score (BCS) for estimating nutritional status was considered an important management tool for evaluating and monitoring production systems. For example, the loss of BSC after calving and cows with BCS <4 (on the International Livestock Research Institute score system of 1–9) at calving displayed poor fertility.

2. In conjunction with poor BCS, it was evident that the season of calving had an important impact on the fertility parameters and that this was particularly evident in Algeria, Sudan, Kenya, Tanzania, Senegal, Cameroon and Ghana.

3. Strategic nutritional intervention, particularly during the dry season, increased productivity and proved economically viable. Malawi (tree legumes), Mauritius (cottonseed cake), Senegal (brewers grains), Tanzania (cottonseed cake and urea molasses blocks) and Morocco (fish silage) had major improvements in milk production and/or time to first oestrus.

4. All countries showed that the measurement of milk progesterone using radioimmunoassay (RIA) proved useful and beneficial in the identification of fertility constraints and breeding management problems. For example, Mauritius identified that farmers could detect

oestrus accurately, that cows were cycling, and that problems with the Artificial Insemination (AI) service contributed to low fertility. Sudan showed that failure to conceive in cycling cows was the major constraint to improving productivity.

5. In Sudan (the only country that carried out blood metabolite studies), the measurement of blood metabolites, in particular elevated globulin levels, suggested the presence of reproductive disease as a significant cause of poor fertility.

6. Most studies were involved with peri-urban dairy production using mainly Friesian cattle and their crosses but Ghana, Senegal and Cameroon used local breeds. Cameroon characterized the features of indigenous dual purpose breeds in an extensive production system which allowed only for subsistence levels of milk production.

CONTRIBUTION OF THE CRP

1. The consolidated research protocol provided to all participants at the commencement of the CRP allowed more integrated interpretations and comparisons across and between all countries.

2. In all countries the research projects brought scientists and farmers closer together. Both groups developed broader respect for one another because of these interactions.

3. Good communication was developed between Research Contract holders, Research Agreement holders and the Joint FAO/IAEA Division ensuring the success of the project. This was enhanced in particular where participants had access to e-mail communication or when Research Agreement holders were able to visit the sites of the Research Contract holders.

4. The projects introduced simple, easy–to–use techniques such as body condition score, the measurement of body weight change, milk production records, etc. into many farming communities improving the knowledge and skills of the farmers leading to increased productivity and better management. In some communities this improved oestrus detection by the farmers.

5. The success of multi-disciplinary projects such as this CRP involved the use of an integrated team approach including scientists, farmers and extension workers. All groups indicated that development of such teams ensured continued motivation and project completion.

6. When distinct nutritional constraints were identified, strategic supplementation with locally available feed resources proved to be cost–effective and sustainable.

7. BSC was a valuable management tool for identifying constraints but manual palpation as a part of BCS, was essential to improve repeatability.

8. There were no problems with the current RIA system using iodinated progesterone. However, the development of a cheap and simple cow side pregnancy test would be useful.

RECOMMENDATIONS

1. Those Research Contract holders who were not able to complete the intervention phase should continue with the studies and evaluate the intervention in terms of its cost effectiveness and sustainability, in their particular environments.

2. Parameters that were used to identify nutritional and management constraints (e.g. RIA for measuring reproductive hormone progesterone, body condition score, body weight measurement, etc.) proved to be extremely useful practical tools for evaluating and monitoring production systems. They should continue to be used in future studies where such evaluations are required.

3. The present approach of supplementation for improving livestock productivity at smallholder level is too confining in identifying multi-factorial influences that are often found in livestock production systems in developing countries. The approach needs to be broader and consider the whole farm as a unit, including all aspects that may constrain livestock production, e.g. nutrition, management, reproduction, disease status. This should be a topic for a future CRP.

4. In any future CRP concerning livestock production, it is important to be aware of constraints to production, prior to the introduction of problem solving technologies. This may involve issues such as health,

reproduction, nutrition, agronomy, marketing, social and cultural aspects, etc. Such an approach will ensure that constraints investigated are the most crucial to the community and the farming system. This approach follows modern extension philosophy.

5. Communications between Research Agreement holders and Research Contract holders should be encouraged especially through new communication systems such as e-mail.

6. The ability of Research Agreement holders to visit Research Contract holders has been very crucial to the success of this CRP and helped to develop effective links and team spirit. This is to be strongly encouraged in future CRPs.

7. The importance of quality control for laboratory techniques, especially of RIA has been highlighted. It is important that the RIA laboratories continue to be associated with the Agency's QA programme.

8. Along with a standard experimental protocol, it is important to have formulated a series of questions for the relationships to be investigated to ensure that all aspects of the study are considered.

9. The integrated 'on-farm' approach is multi-factorial in nature. Therefore, simple experimental statistical techniques have limitations and alternative designs need to be considered. The Agency needs to investigate the most appropriate statistical approach to such studies.

10. For strategies evolving from this experimental results to have an impact there must be an effective means of informing the farming community. Therefore, an effective extension plan must be a part of the experimental protocol, including documents on how to get technical information to farmers.

11. While it is important to assess the effects of interventions in the short term, long term monitoring may be important to assess the consequences of such interventions in a multi-factorial production system.

Third RCM on "Use of Immunoassay Methods for Improved Diagnosis of Trypanosomosis and Monitoring of Tsetse and Trypanosomosis Control Programmes in Africa" (D3.20.13)

This third RCM was held from 5 to 9 October 1998 in Entebbe, Uganda.

All fifteen Research Contract holders and four Research Agreement holders were able to attend. During the opening ceremony a word of welcome was delivered by the Senior Assistant Secretary of the Ministry of Energy and Mineral Development and by the Dean of the Veterinary Faculty of the University of Kampala. The meeting was opened by the FAO representative.

At the meeting each Research Contract holder presented the results of the research activities during the past year and proposed a work plan for the coming year. The work plans were discussed during the meeting, while equipment and training needs were discussed with each participant individually.

The presentations of the Research Contract holders showed that the antibody-detection ELISA is capable of discriminating between trypanosome-positive and negative animal populations. However, the test antigen proved to be unstable resulting in low optical density values following transport. Background phenomena occurred using field samples and cross reactivity between the trypanosomes pathogenic for cattle was observed. The latter phenomenon can be expected due to the mixture of proteins used as antigen. Nevertheless, the test will be useful for monitoring control programmes and to assess the distribution of trypanosomosis in Africa. Recent improvements to the test made at the FAO/IAEA Agriculture and Biotechnology Laboratory at Seibersdorf have now resulted in a stable antigen preparation.

During a practical laboratory session the Research Contract holders were given an opportunity to perform the antibody-detection ELISA using pre-coated plates. The results of the ELISA plates prepared by the Research Contract holders showed that the reliability of

the replicates was very good. Moreover, the trypanosomal antigen proved stable following transport to Africa without refrigeration or any other special conditions. At the same time lectures were given on quality assurance, good laboratory practice and standard operating procedures.

It was recommended at the meeting that reference standards should be prepared for use in antibody- and antigen-detection ELISAs. Moreover, standardized reagents and a standard protocol as distributed by the Joint FAO/IAEA Division were considered a prerequisite for obtaining reliable diagnostic results. Furthermore, it was proposed that blood spots on filter paper should also be part of the validation process for the antibody-detection ELISA since it is a very practical technique for field use. During the meeting it was stressed that the sequential and/or the combined use of simple tests (such as BCT, PCV and clinical signs) will increase the predictive value of any single test. Moreover, scientists were reminded that the presence of heterophilic antibodies in serum samples (for example elicited by repeated infection of cattle with trypanosomes grown in rodents) will influence the results of serological assays. In addition, it was recommended to study the kinetics of trypanosomal antibodies following treatment of trypanosome infected animals.

The RCM was organized in combination with a Workshop of the Concerted Action on "Integrated control of pathogenic trypanosomes and their vectors" funded by DG XII of the European Commission under the International Co-operation with Developing Countries programme (INCO–DC). This was the first Workshop of the Concerted Action dealing with "Diagnosis and epidemiology of tsetse (and non-tsetse) transmitted trypanosomosis". By combining the RCM and the Workshop, it was possible to bring together a large group of experts on the subject (namely 28 scientists from Africa, South America and Europe). Eleven scientific presentations were given by the various experts as part of the Workshop of the Concerted Action initiative. During the Workshop it was agreed that all Research Contract holders should become associate partners of the Concerted Action initiative.

Regional Training Workshop on "External Quality Assurance (EQA) for Progesterone Radioimunoassay" (RAF/5/041)

This Training Workshop was held in Lusaka, Zambia, from 2 to 6 November 1998, as a component of the AFRA Project II–17 "Development and field evaluation of animal feed supplementation packages", and as a follow-up to a previous Workshop held in May 1997 in Tunisia. It was aimed at consolidating the assistance provided to counterpart institutes in AFRA Member States to establish and use the 'Self-coating RIA' (ScRIA) technique, which has been recently developed by the FAO/IAEA Sub-programme on Animal Production and Health, for measuring progesterone in milk and blood of farm livestock. The objectives were to provide further training and information on how this technology can be applied in the field to assist livestock farmers and to institute a quality management (QM) system which would ensure the validity, reliability and reproducibility of laboratory data upon which important management decisions would be made for improving the efficiency of productivity of livestock raised by rural farmers in Africa.

The Workshop was held at the Department of Biomedical Sciences of the Samora Machel School of Veterinary Medicine, University of Zambia, Lusaka, with Professor Cheryl Lovelace as the Course Director and was supported by one external lecturer (Dr. Mario Garcia, Peru) and two IAEA staff members (Oswin Perera, RIFA and Elmuetassem Benkhadra, RIAL). It was attended by 10 of the 12 selected foreign participants and by all four local participants.

The conclusion was that all counterpart laboratories participating in the AFRA II–17 programme have achieved good proficiency in the performance of the DPC coated-tube RIA. With respect to the new ScRIA, however, several laboratories require further experience in its use and, in some cases, assistance in the

form of training and/or expert services. It was recommended that all laboratories in AFRA Member States using RIA for livestock development activities should participate in the FAO/IAEA EQA programme, and that they should be provided with the necessary guidelines and assistance to complete the requirements necessary for FAO/IAEA recognition.

FAO/IAEA/OAU Workshop on "Emergency Preparedness and Disease Surveillance for Southern Africa" (RAF/5/043)

The Workshop took place from 23 to 26 November 1998 in Harare, Zimbabwe.

More detailed information on the Workshop will be given in the next issue.

Task Force Meeting on "Strategies for Future Sustainability of the Applications of Progesterone RIA for Improving Livestock Production in Developing Member States" (RAF/5/041)

This meeting was arranged under the framework of the AFRA Project II–17 and was attended by invited participants from Africa, Asia/Pacific and Latin America regions, as well as outside consultants and staff from the IAEA. It was held from 7 to 10 December 1998 in Vienna, Austria. A full report will be provided in the next Newsletter.

D. STATUS OF EXISTING CO-ORDINATED RESEARCH PROJECTS

Use of RIA and Related Techniques to Identify Ways of Improving Artificial Insemination Programmes for Cattle Reared Under Tropical and Sub-tropical Conditions (D3.10.20)

Technical Officer: Oswin Perera

This CRP has 14 Research Contracts, 1 Technical Contract and 4 Research Agreements. Research Contract holders have all completed the field survey to evaluate artificial insemination services and are now nearing completion of the follow-up studies and interventions recommended at the Second RCM which was held in Melbourne, Australia, in February 1997. The Final RCM will be held in May 1999.

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

Technical Officer: Oswin Perera

The CRP will continue into Phase II — see conclusions and recommendations of the RCM held from 24 to 28 August 1998 (see Past Events).

As requested during the meeting, six new Research Contracts will be awarded.

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

Technical Officer: Harinder Makkar

This CRP in its first phase, has 6 Research Contracts and 4 Research Agreements. No further awards are anticipated. The first RCM will be held in Vienna, Austria, from 8 to 12 March 1999.

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

Technical Officer: Ron Dwinger

The CRP is aimed at using an immunoassay technique (ELISA) for improved diagnosis of trypanosomosis and at applying this serological technique together with standard parasitological techniques, such as the buffy coat technique (BCT) for monitoring the effectiveness of tsetse and trypanosomosis control programmes.

The Research Contract holders were sent two indirect ELISAs to detect antibodies directed against *Trypanosoma congolense* and *T. vivax* at the end of November 1998. Three Research Contract holders also received additional ELISA systems (using native and denatured antigen).

Research results should be compiled in the form of a scientific article for publication in a Technical Document (instructions to authors can be obtained from the Animal Production & Health Section) and forwarded to Vienna before May 1999. The final RCM is planned for September 1999 in Addis Ababa.

Use of Immunoassay Technologies for the Diagnosis and Control of Foot–and–Mouth Disease in South East Asia (D3.20.14)

Technical Officer: Martyn Jeggo

This CRP has 10 Research Contracts and 3 Research Agreements and no further awards can be considered. The final RCM will take place in Cambodia from 22 to 26 February 1999 (see also under Forthcoming Events).

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

Technical Officer: Andrea Gervelmeyer

The CRP has 20 Research Contracts and 2 Research Agreements. The research focuses on the use of the FAO/IAEA rinderpest ELISA for the surveillance of rinderpest through surveys and active disease search. The second RCM will be held from 22 to 26 February in Addis Ababa, Ethiopia (see also under Forthcoming Events).

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

Technical Officer: John Crowther

The CRP has 7 Research Contract holders involving investigations on rinderpest, peste des petits ruminant (PPR), contagious bovine and caprine plueropneumonia (CBPP and CPBB). The second RCM will be held in Onderstepoort, South Africa, from 21 to 25 May 1999. In this meeting work carried out will be reviewed and work plans agreed.

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

Technical Officer: Andrea Gervelmeyer

The CRP has 11 Research Contracts and three Research Agreements. The research carried out under this project is aiming at the validation of the competitive CBPP ELISA for the diagnosis of antibodies against *Mycoplasma mycoides mycoides sc.* The second RCM will be held from 13 to16 November 1999 in Nairobi, Kenya (see also under Forthcoming Events).

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

Technical Officer: Ron Dwinger

This CRP has 12 Research Contract and five Research Agreement holders.

A consultants meeting and a video conference will be organized from 9 to 13 November 1998, to advise and discuss the implementation of the CRP. The CRP will be initiated during the first RCM. This meeting will be organised in Rabbat, Morocco, from 8 to 12 February 1999. During the meeting work plans will be developed and research details discussed among the Research Agreement holders and the Research Contract holders.

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

Technical Officer: John Crowther

The CRP has 13 Research Contract six Research Agreement holders. The CRP will begin in January 1999.

E. NEW CO-ORDINATED RESEARCH PROJECTS

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

Technical Officer: Martyn Jeggo

The closing date for submission of Research Contract proposals for inclusion under this new project has now passed. Some 50 applications have been received and these will be evaluated by the end of 1998. Those Research Contracts selected for inclusion in the project will be notified early in 1999, and it is anticipated that the first RCM will be held some time in mid–1999.

General information applicable to all Co-ordinated Research Projects

Submission of Proposals

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

Complementary FAO/IAEA Support

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

F. QUALITY ASSURANCE PROGRAMMES

In the previous Newsletter, a brief summary of the achievements, status and future of the FAO/IAEA External Quality Assurance Programme for Animal Disease Diagnosis was given. This was derived in part from the report of an External Consultants meeting entitled "The FAO/IAEA External Quality Assurance Programme (EQAP) and Movement towards a Generic Veterinary Diagnostic Testing Laboratory Accreditation Scheme" held in Vienna from 2 to 6 February 1998.

A central recommendation of this meeting was for the FAO/IAEA Animal Production and Health Sub-programme to assist counterparts in developing a quality management and documentation environment. To that purpose, an FAO/IAEA document entitled "Internal Quality Control (IQC) of Competitive Enzyme Linked Immunosorbent Assay (C-ELISA) for the measurement of antibodies against Rinderpest and Peste des Petits Ruminants (PPR) viruses using charting methods" [9] has been written and will be distributed soon. The principles of this document are already being applied in some laboratories, and can be applied in any diagnostic testing laboratory as one essential part of the EQAP through the analysis, graphical presentation and interpretation of internal quality control (IQC) data, similar to that seen in the EQA interim reports. The document describes the correct way to produce IQC data for intra- and inter-assay evaluation of internal controls, giving advice how to produce daily and summary charts seen from the practical point of view. Finally, the counterpart will be able to produce and evaluate such charts. Identifying the source of error, he/she may be able to troubleshoot problems since certain patterns of assay behavior may result in typical chart presentations. Another important issue that will be aided by monitoring IQC results is the transparency of technical skills to perform an assay over time, which can be regarded as 'key' information for other interested 'outside bodies'. Although this document focuses on Rinderpest and PPR, it can be regarded as a baseline for the analysis of internal quality controls of any other FAO/IAEA ELISA.

Applying criteria for laboratory 'recognition' for the RP97a and BRA97a (retrospectively)

Criteria for laboratory 'recognition' were applied as outlined in the 1994 FAO/IAEA Consultants report on the EQAP [5]. For users of the FAO/IAEA cELISA for Rinderpest during RP97a, 8 laboratories qualified for the 'provisional recognition' and 5 for 'recognized' status [1].

In a similar way, the same criteria will be applied for laboratory 'recognition' of those laboratories using the indirect brucellosis ELISA during BRA97a [2].

EQAP participants in all rounds from 1998 onwards will be assessed for laboratory 'recognition' according to the criteria established in the 1998 EQAP Consultants Report [8]. It should be emphasized that this 'recognition' is for programmatic purposes, and should not be confused with the terms 'Certification', 'Accreditation', or 'Compliance Recognition' as applied by the International Standards Organization (ISO) or any other group. For a complete list of the FAO/IAEA criteria for laboratory 'recognition', please contact your Technical Officer or the EQAP Co-ordinator.

New ELISAs in the EQAP

As mentioned in the introductory article of this Newsletter, we will be incorporating some new serological assays for CBPP, Newcastle Disease and a new FMD ELISA using non-structural protein as Ag (Table I) into the Sub-programme activities. These will become part of the EQAP beginning in 1999, and we have a new colleague from Brazil, Dr. Helder Louvandini, to assist us in expanding the current EQAP. An overview of the activities planned in 1999 is given in Table I.

Criteria for participation in our EQAP are the use of an FAO/IAEA ELISA kit and your involvement in a national or regional FAO or IAEA-TC project or FAO/IAEA Co-ordinated Research Project.

TABLE I EQAP IMPLEMENTATION AND FUTURE ACTIVITIES WITH ELISA 1995–1999

ELISA	1995	1996	1997	1998	1999	Remarks
Rinderpest comp. Ab	Rp95a	Rp96a	Rp97a	1*, 2	1,2	Africa and West Asia No. of participating laboratories: 1995 23; 1996 29; 1997 29; **1998 28**
Brucellosis – indirect Ab – competitive Ab	Bra95a	Bra96a	Bra97a *	1*, 2	1,2	Worldwide No. of participating laboratories: 1995 31; 1996 35; 1997 39; **1998 32**
FMD – Ag – Ab		** **		1	1	South East Asia No. of participating laboratories: 1996 10 **1998 10** (only Ab ELISA serotype O)
Trypanosomosis – Ag – Ab		Tryp96a		1	1	The Ag Tryp96a included 3 Ag (*T. brucei, T congolense and T. vivax*). 16 laboratories participated **Tryp98a**: the Ab Tryp. ELISA using denatured *T. cong* Ag on precoated plates was used on the basis of an interlaboratory comparison, **1998** **6** laboratories in West Africa participated. Another EQA round is planned in 1999.
CBPP comp. Ab					1,2	Planned in 1999
Newcastle disease Ab ELISA					1,2	Planned in 1999
FMD NSP ELISA					1,2	Planned in 1999

Rp95a, Rp96a, Rp97a, Bra95a, Bra96a, Bra97a, Tryp96a = Interim Reports
1 = full EQA cycle including interim report)
2 = start EQA cycle
* = interim report in preparation
** = no interim report, but results communicated on an individual basis

The EQA rounds for the FAO/IAEA competitive Rinderpest ELISA

RP98a

Twenty eight laboratories participated in this round. An interim report will be produced and distributed by the end of the year.

RP98b

The next round will be prepared and distributed before the end of 1998.

The EQA rounds for the FAO/IAEA indirect brucellosis ELISA

EQA rounds were undertaken exclusively for the indirect brucellosis ELISA in 1998.

BRA97a

Results of the third round (BRA97A) are being analysed and will be published by November 1998 in the BRA97a interim report. A total of 38 laboratories in Africa, Asia and Latin America participated in this round.

BRA98a

As foreseen, the number of participants was less than last year (32). Results will be published in the BRA98a interim report, which will be published by December 1998.

BRA98b

A second round for the indirect brucellosis ELISA is planned to be initiated and distributed by end of 1998.

The EQA round for the FAO/IAEA trypanosomosis antibody ELISA

Results from an interlaboratory comparison of six West African countries using the 'precoated' ELISA plates were highly encouraging. Another EQA round will commence in early 1999 using these plates.

The EQA round for the FAO/IAEA foot–and–mouth disease ELISA

An EQA round for the liquid phase blocking antibody ELISA for 10 SE Asian countries was started in autumn 1998. This round focuses only on serotype 'O'. Results are expected to be analysed and reported for January 1999.

A new antibody ELISA, using non-structural protein as Ag, will be included in the EQA programme by 1999.

The EQA round for the FAO/IAEA CBPP ELISA

An EQA round for this ELISA is planned for early 1999.

The FAO/IAEA EQAP for Progesterone RIA

In addition to the EQAP for Animal Disease Diagnosis, the Sub-programme has incorporated on-going external quality assurance activities in the area of radioimmunoassay (RIA) for determinations of progesterone in milk, plasma, and serum into the overall EQAP structure. Recently, analysis of the 20th round of this activity was completed and a report distributed to all participants. In the future, "recognition" criteria will be applied to laboratories participating in the FAO/IAEA EQAP for Progesterone RIA as well. This will be done in order to provide more feedback to those laboratories that consistently participate and do well in this programme, as well as to improve on the perception of the reliability of data produced by these laboratories, as judged by outside observers.

SELECTED FAO/IAEA EQA LITERATURE

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G. COMPUTER SOFTWARE PROGRAMS

1. SID

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

On a more general note, under the FAO EMPRES programme a new software program called TADINFO is being developed for use at the national, regional or global level. This program will be designed to allow those making decisions on disease control or eradication to be better informed through a systematic collection and multiple manipulation of reports on disease occurrence. It is foreseen that such reports will be geo-referenced (either at the point of collection or subsequently centrally) to allow the full use of GIS (geographical information system) in analysing these reports. One missing link within this approach is a software program for tracking laboratory samples from their collection point, to the laboratory for testing and the submission of a final test report. It is conceived that SID could provide a suitable framework from which to develop such a software package.

Driving the TADINFO initiative from FAO Headquarters in Rome is Roger Paskins and he will work closely with us, and particularly with Bernadette Abela in Vienna to see how best SID can be redesigned to meet this critical need. We will keep you posted!

2. EDI

Although EDI 2.2 has been well received by many counterparts, a number of problems have been highlighted in the Immunocapture (ICE) module for Rinderpest/PPR. Solutions to these problems, plus the option to use additional plate readers, will be incorporated into EDI 2.21, which should be available during the first quarter of next year. All of the other assay modules of EDI 2.2 appear to be working well, and the current version is available from your FAO/IAEA Technical Officer.

H. GEOGRAPHICAL INFORMATION SYSTEMS — UPDATE

New geo-referenced tsetse and bovine trypanosomosis data have been received in October 1998 from the following countries:

Cameroon: An update of over 6000 geo-referenced blood samples, tsetse and herd data (total number of data: 11247; period November 1994 – February 1997).

Uganda: Geo-referenced data on serum, blood and tsetse samples of fourteen (14) different locations (six (6) districts) in Uganda.

Ghana: Geo-referenced blood and serum sample data. Geo-referenced tsetse trapping results from different trap locations and different sample periods (May, June and August 1998, data from December 1997 not geo-referenced). GPS readings and prevalence study of sentinel herd of the periods May, June and August 1998. Due to poor coverage, there are no GPS data available for this study during the months May and June.

An updated GIS training manual is in preparation on the application of the following software programs: ARC/INFO, ArcView for desktop mapping and IDRISI for image analysis and presentation. A fellow from Zanzibar will receive training on data analysis and mapping of tsetse trypasonomosis prevalence and tsetse distribution in relation to vegetation, land use and population data.

A system for the determination of priority areas for tsetse control in Africa using a GIS approach is being prepared; based on different (external) factors, e.g. habitat of tsetse (vegetation, climate, elevation, etc.), population pressure (cattle and human), livestock distribution and land use, the criteria for prioritization will be set by a team of experts from different disciplines (e.g. health,

environment, economy, agriculture) before an analysis method can be defined and a final modelling framework can be made. The identification of priority areas will be done in close collaboration with FAO and the University of Oxford.

I. PUBLICATIONS

Published:

1. Towards livestock disease diagnosis and control in the 21st century: Proceedings of an International Symposium on Diagnosis and Control of Livestock Diseases Using Nuclear and Related Techniques/jointly organized by the International Atomic Energy Agency and the Food and Agriculture Organization of the United Nations and held in Vienna, 7–11 April 1997 — Vienna, IAEA, 1998, STI/PUB/1023.
2. TECDOC entitled "Diagnosis and Epidemiology of Animal Diseases in Latin America": Proceedings of the Final RCMs of an FAO/IAEA/SIDA Co-ordinated Research Programme entitled "Immunoassay Methods for the Diagnosis and Epidemiology of Animal Disease in Latin America" held in Guadeloupe, Lesser Antilles, 13–17 June 1994 and "The use of ELISA for Epidemiology and Control of Foot–and–Mouth Disease and Bovine Brucellosis in Latin America" held in Vienna, Austria, 14–18 April 1997. — IAEA–TECDOC–1055, Vienna, IAEA, 1998.

In Press:

1. A special edition of the Journal of Preventive Veterinary Medicine. This publication will contain most of the reports of the Final RCM of the FAO/IAEA Co-ordinated Research Project on Development of Supplementation Strategies for Milk-producing Animals in Tropical and Subtropical Environments held in Malang, Indonesia, 24–28 March 1997, PREVET January 1999: Volume 38, issues 1–2.

In Preparation:

1. Proceedings of the Final RCM of the Co-ordinated Research Programme on "Development of Feed Supplementation Strategies for Improving the Productivity of Dairy Cattle on Smallholder Farms in Africa" held at the Agency's Headquarters in Vienna, Austria, from 7 to 11 September 1998.
2. Proceedings of the Final RCM of the Co-ordinated Research Programme on "Development, Standardization and Validation of Nuclear Based Technologies for Measuring Microbial Protein Supply in Ruminant Livestock for Improving Productivity" held at the Agency's Headquarters in Vienna, Austria, from 24 to 28 August 1998.

   Both these proceedings will be published in early 1999 as FAO/IAEA TECDOCs.
3. Surveillance of Rinderpest in Africa — Reports 1997/1998.
4. BRA97a
   Results of the third round (BRA97A) are being analysed and published in November 1998.
5. BRA98a
   As foreseen, the number of participants was less than last year (32). Results will be published in the BRA98a interim report, in December 1998.
6. RP98a
   28 laboratories participated in this round. An interim report will be produced and distributed by the turn of the year.

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