



# Animal Production and Health Newsletter

JOINT FAO/IAEA DIVISION OF NUCLEAR TECHNIQUES IN FOOD AND AGRICULTURE  
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Dear Colleague,

The first half of this year has been significant in a number of respects for the activities of the Animal Production and Health Section of the Joint FAO/IAEA Division. Firstly, the research programme operated by the Section has recently been strengthened by the securing of substantial funds from outside bodies. This programme currently consists of 8 Coordinated Research Programmes involving over 130 institutes worldwide and towards the end of the year a further programme dealing with camelids will also become operational. Four of these programmes were supported for the past 3 and 5 years by the Governments of the Netherlands and Sweden respectively and were recently the subject of in-depth external evaluations. Arising from these evaluations, we were requested by the organisations concerned to submit proposals for funding of new programmes, and I am delighted to report that our proposals have now been accepted. In addition, we were recently successful in obtaining funds from the Government of the UK to support our efforts in disease diagnosis. With these three sources of funding, we can now continue our support of programmes in cooperation with FAO's Animal Production and Health Division on rinderpest and trypanosomiasis in Africa and for programmes in animal production in Africa and Latin America, and we can also now embark on efforts to achieve international acceptance of our disease diagnostic kits. The securing of such substantial outside funding for another 5 years or so is vital for allowing the Section to continue supporting animal production and health activities in developing countries at the level which has been possible over the past few years, and we are extremely grateful to the Governments of the Netherlands, Sweden and UK for assisting our efforts in this way. We are of course examining further possibilities with other organisations and with a bit of luck something else may come up towards the end of this year!

Related to these developments, and this is the second significant point we would like to mention, is that by the end of this year two major programmes will be completed - i.e. the SIDA-supported rinderpest sero-surveillance programme in Africa and the Latin American regional network on animal disease diagnosis. These programmes represented the Joint FAO/IAEA Division's first efforts to introduce immunoassay (ELISA) methods for disease diagnosis/surveillance into veterinary investigation centres and universities in developing countries. As these programmes reach completion, it is interesting to reflect on what they have achieved and to describe some of our plans for the future in this particular area.

We have no doubt that these programmes on disease diagnostics have helped many institutes in developing countries to establish and make a good start with using modern immunoassay methods to diagnose or monitor diseases of significance to the countries concerned. This is clear from the positive feedback we have received not only from the institutes and scientists directly involved, but also from information we have received from national and regional bodies, and indeed from other international organisations. Another major output of the research and development work supported by the SIDA programmes is the availability of FAO/IAEA "kits" for diagnosing or monitoring animal diseases using ELISA's. For example, kits are now available for diseases such as rinderpest, brucellosis, babesiosis, IBR, Aujeszky's, bluetongue, etc, and while not all of these have yet been evaluated to our complete satisfaction, some are already or very soon will be available in a format which will hopefully result in "international acceptability".

As things stand at present, the FAO/IAEA programme on animal diseases will therefore focus over the next 4-5 years on completing the validation of ELISA tests for specific diseases and encouraging the use of validated tests for diagnosing diseases, monitoring control or eradication programmes and for conducting epidemiological surveys. Two new programmes are advertised in this Newsletter and hopefully the applications we receive for Research Contracts will help us to achieve these aims. However, along the way, and as sufficient data are gathered, we will seek acceptance of our test kits as international "standards", and when a "finished product" emerges, we will endeavour to make it available to national veterinary authorities. The present SIDA-supported programme has already helped tremendously to achieve these goals for some diseases. For example, the FAO/IAEA rinderpest test has already been accepted by EEC, OIE and OAU, and our brucellosis and bluetongue tests are going through the final stages of international acceptance. However, more needs to be done in this context and this explains the holding of the Consultants' group meetings mentioned later for bluetongue and foot-and-mouth disease.

The third point about our activities this year is that although we have held only one RCM so far, three further RCM's, two regional training courses and two Consultants' meetings will take place before the end of the year. The planning of these meetings, together with the completion of the two new publications referred to later in this Newsletter have kept everyone pretty busy. However, in addition to these matters, we would like particularly to bring to your attention the fact that in April 1991, the IAEA and FAO are sponsoring an International Symposium on animal production and health. Full details of the scope of this Symposium, how to go about applying for participation, and copies of the relevant forms are included. If you are interested in participating, please adhere to the deadlines indicated and remember to send the information requested through the "official channels". You can't participate if you don't do this!

Finally, the staffing of the Section is still in some flux. We have not completely recovered from the departure of 6 staff members between September and December of last year, and in fact since then a 3 further staff members have resigned. First of all, Mark Eisler, our ODA-funded Associate Professional Officer, left us at the end of February to take up a field position in Yemen with ODA. Then last week, Francesco Castrignano (an Italian-funded APO) took up an appointment with the National Institute for Alternative Energy (ENEA), Rome, and Dan Sharp, who was on sabbatical leave from the University of Florida, returned to his home institute. While we are naturally very sorry to lose the services of Mark, Francesco and Dan, we always knew that their periods of service with the Joint Division would be relatively short and therefore their departures were entirely expected. We wish them all the best for the future and thank them for all they did to promote the Section's activities over the past 1-2 years.

On the other side of the coin, we have now been joined by some of the people mentioned in the January edition of the APH Newsletter, and others are about to arrive. For example, Lal Peiris (Sri Lanka) has taken up his appointment at the Seibersdorf Unit, as have Giovanni Re (Italy), Eugene van Rooij (Netherlands) and Roland Geiger (FRG). In addition, we can now announce 5 further significant appointments. In the first place, Dr. Mario Garcia (Peru) has joined the Section as the Technical Officer responsible for our animal production activities in the Latin American region. Mario comes from San Marcos University in Lima

and has worked extensively on small-scale dairy cattle production in the Amazona region of Peru. Mario replaces Noble Jayasuriya who is presently in Malawi working on an FAO project. Secondly, Dr. Peter Wright (Canada) has joined the Section from Agriculture Canada as Head of the Animal Production Unit at Seibersdorf. Peter's main interest is in ELISA methods for disease diagnosis and the quality control aspects of these tests, and while his work has primarily been with Agriculture Canada's Nepean Laboratory in Ontario, he has also gained substantial experience in using these methods in developing countries through working for the United Nations University and FAO/IAEA.

The third new member of staff is Dr. Trevor Wilson (UK). Trevor will join the Section in September from the International Livestock Centre for Africa (ILCA) in Ethiopia and takes over from Wyn Richards the responsibility of running the Section's animal production programme in Africa as well as assisting similar activities in Asia and Latin America. Trevor's strong background in animal production "systems" in general and his particular expertise in African livestock (including camels) fit well with the direction of the Section's future activities. Fourthly, and also in September, we will be joined by Dr. Jorge Moreno-Lopez, a virologist from the College of Veterinary Medicine of the Swedish University of Agricultural Sciences. Jorge's job will be to run the Section's disease diagnostics programme in Latin America - an area of the world which Jorge knows well and which should benefit substantially from the large increase in FAO/IAEA programmatic activities which will take place there over the next few years. And finally, around the beginning of October, Dr. Michael Bryant will join us for 1 year on sabbatical leave from the University of Reading (UK). Mike has worked extensively on the interactions between nutrition and reproduction and has substantial experience of developing country problems through research and teaching.

The few staff members who have tried to keep the programme running as smoothly as possible over the past 9 months in the face of so many departures, very much welcome the arrival of all the "newcomers"! As can be seen from the contents of this Newsletter, it is highly unlikely that they will have too much spare time on their hands!

With best wishes,

James D. Dargie  
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(B) PAST EVENTS

FAO/IAEA First Research Coordination Meeting on "Development of Feed Supplementation Strategies for Improving Ruminant Productivity on Small-holder Farms in Latin America through the Use of Radioimmunoassay Techniques", Santiago de Chile, 14 - 19 May 1990

The First Research Coordination Meeting (RCM) of this programme was held at the University of Chile, Santiago de Chile. It was attended by thirteen research contractors representing 11 countries in the Latin American region. This group was completed by three research agreement holders from Canada, United Kingdom and Chile. In addition, one observer from Bolivia, another representing the Government of Spain, and a staff member from FAO's Regional Office in Santiago attended the meeting. We would like to thank all those who helped with the local arrangements for the meeting. In particular, the immense number of hours spent by the two counterparts in Chile, Miss Cecilia Urbina and Miss Bessie Urquieta, in providing all the infrastructure necessary for this successful meeting.

The primary aim of this new Latin American network is to obtain scientific knowledge and technical information which can subsequently be used to institute low-cost management changes based on suitable feeding strategies to improve the productivity of indigenous ruminant livestock maintained on typical small-holder farms in the region. To this effect, each participant presented a detailed work plan which was then discussed and, if required, modified through discussion with the rest of the participants. Most of the presentations were successful in bringing out the importance of conducting research into the effects of nutrition on reproductive efficiency, and in the use of locally available by-products as animal feeds. These varied from the use of carnation flowers not utilised for export in Colombia, to sugar cane by-products, brewery grains, chicken litter, citrus bagasses and urea. Under the programme the use of these products together with appropriate minerals will form the basis of attempts to develop supplementation strategies which will improve reproductive efficiency and productivity. Reproductive performance of supplemented animals will be compared with the appropriate controls. Among the variables to be measured will be progesterone levels either in milk or blood and reproductive parameters such as age at first calving, parturition interval and days open, as well as body weights, condition scores, etc.

The decision to initiate an interdisciplinary approach within the context of this new Regional programme bringing together scientists interested in the interaction between reproduction and nutrition proved to be beneficial since different approaches to a common problem (poor productivity of livestock in Latin America) brought about discussions which enriched the participants' work plans. While the language chosen for the meeting (English) caused some discomfort to several of the participants, the importance of presenting the data in English was stressed and will be maintained, particularly as Research Agreement holders and in many instances observers are not fluent in Spanish.

Each agreement holder was assigned responsibility for assisting two or three specific contract holders, not only in the development of the work plans, but also for continuing dialogue through correspondence. The progress reports from the contract holders will also be sent to the respective agreement holders. In addition, the provision of certain reagents and materials will be arranged through the agreement holders

where appropriate. These measures should promote greater interaction between the contract and agreement holders, and contribute to achievement of the objectives of the programme.

For the next RCM of the programme it was recommended that a one-week workshop on scientific writing and data processing be arranged.

(C) STATUS OF EXISTING COORDINATED RESEARCH PROGRAMMES

(i) Regional Network for Latin America on the Use of Immunoassay and Labelled DNA Probe Methods for the Diagnosis of Livestock Diseases

This SIDA-funded programme currently has 12 Research Contract and 3 Research Agreement holders and we are not seeking further participants. The final RCM under the programme will be held in San José, Costa Rica, from 22 - 26 October 1990 in association with a workshop on animal diseases being held under the auspices of the International Foundation for Science (IFS).

(ii) Regional Network for Sero-surveillance of Rinderpest in Africa

This programme has 21 contract holders and three agreement holders and no further awards can be considered. The final RCM under this programme is being planned for Bingerville, Côte d'Ivoire, between 19 - 23 November 1990.

(iii) Development of Feeding Strategies for Improving Ruminant Productivity in Areas of Fluctuating Nutrient Supply through the Use of Nuclear and Related Techniques

This programme has 14 Research Contracts and 5 Research Agreements and no further awards can be considered. The 2nd RCM of the programme will take place in Khon Kaen, Thailand, from 22 - 26 October 1990.

(iv) Improving the Productivity of Indigenous African Livestock using Radioimmunoassay and Related Techniques

This programme is funded by the Ministry of Foreign Affairs of the Government of the Netherlands. The programme has 16 Research Contracts and 2 Research Agreements. No further participants can be accepted. The third RCM of the programme will be held during the first few months of 1991.

(v) Improving the Diagnosis and Control of Trypanosomiasis and other Vector-borne Diseases of African Livestock using Immunoassay Methods

This programme, also funded by the Government of the Netherlands, has 12 Research Contract and 2 Research Agreement holders; we are not seeking further proposals. The third RCM of this programme will also be held early in 1991.

(vi) Strengthening Animal Reproduction Research in Asia through the Application of Immunoassay Techniques

This programme now has a full complement of 10 contracts and 3 agreements. The list of participants was included in the Newsletter of January 1989. The second RCM will be held in Manila, the Philippines, from 4 - 8 February 1991.

(vii) Strengthening Animal Disease Diagnosis in Asia through the Application of Immunoassay Techniques

This programme has 9 contracts and 2 agreements and we are not seeking any further proposals. The second RCM will be held in Manila, the Philippines between 4-8 February 1991.

(viii) Development of Feed Supplementation Strategies for Improving Ruminant Productivity on Smallholder Farms in Latin America through the Use of Radioimmunoassay Techniques

This programme has now been initiated with the award of 14 Research Contracts and 4 Agreements to the scientists and institutions mentioned in the previous edition of the Newsletter, and no further awards can be considered. The 1st RCM under the programme which will be held in Santiago, Chile, from 14-18 May 1990, will be followed by a second RCM, probably towards the end of 1991.

(ix) Inter-Regional Research Network for Improving the Productivity of Camelids through Studies on Reproduction and Reproduction x Nutrition Interactions

This programme was advertised in the previous edition of the Newsletter. The deadline for receipt of applications for Research Contracts and Agreements has now passed, and already we have received far more good proposals than we can fund. Therefore, we are not seeking any further proposals and a decision on the composition of the Network will be made by September. We hope to be in a position to hold the 1st RCM of the programme during the early part of 1991, and probably in Africa.

(D) NEW COORDINATED RESEARCH PROGRAMMES

Thanks to the continued generous support to our programmes from the Swedish International Development Authority (SIDA), we intend to implement two new Coordinated Research Programmes during the first few months of 1991 in cooperation with FAO's Animal Production and Health Division in Rome. The first of these will be restricted to African institutions and to the seromonitoring of rinderpest, while the other will be restricted to the Latin American region and to the use of immunoassay methods for the diagnosis and conduct of epidemiological studies on foot-and-mouth disease, brucellosis, and tick-borne diseases. Consideration may also be given to bluetongue, leukosis, IBR and Aujeszky's disease subject to availability of funds and interest, but it should be emphasised that proposals for contracts for FMD, brucellosis and tick-borne diseases will be given priority. Proposals for both the rinderpest and the Latin American programme should be sent (in duplicate) to Ms. T. Benson-Wiltschegg, Head of the Research Contracts Administration Section of the IAEA; before 30 November 1990.



1. PROGRAMME 1

(i) Title of Programme: Immunoassay Methods for Sero-monitoring of Rinderpest in Africa

(ii) Background

The Pan African Rinderpest Campaign aims at the control and eventual eradication of rinderpest in Africa through a programme of mass vaccination of cattle on a national basis. Primarily funded by the EEC, with additional support provided by FAO and various bilateral funding organisations, the campaign provides governments of individual countries with support to create a veterinary service capable of conducting an annual vaccination campaign and routine sero-monitoring to assess this vaccination programme.

It is envisaged that on a national basis some 5-10,000 sera will need to be tested each year. The OAU and PARC have adopted the FAO/IAEA Rinderpest ELISA kit as the official methodology to be employed in conducting this testing on a routine basis. This test kit was developed, fully validated and standardised under the FAO/IAEA/SIDA programme which terminates in November 1990. The kit is supplied in two parts - one from the IAEA's Seibersdorf Laboratory in Austria and the other from the Pirbright Laboratories, UK. Linked with the kit is a quality control service operated from the IAEA's Laboratory, and further support packages include a manual on serum sampling protocols and computer software packages to assist in data management.

Under PARC it is envisaged that on a national basis routine sero-monitoring will be conducted to ensure that the national herd is successfully annually vaccinated. To achieve this, it is proposed that sampling teams under the direction of National Co-ordinators follow the vaccination teams approximately one month later and undertake serum collection. They will adopt a sampling protocol which will ensure collection of samples from animals missed by vaccination teams as well as samples from animals assumed to have been vaccinated. In this way, testing of samples collected should detect not only the use of ineffective vaccine but also groups of animals never vaccinated. The serum samples collected will be submitted to the appropriate national or regional laboratories for testing for antibodies to rinderpest virus/vaccine. These laboratories, by speedily reporting the results back to National Co-ordinators, will enable vaccination programmes to be assessed and indeed altered if necessary in an on-going manner. In the long-term, annual assessments of campaigns (both at the national and regional level), will be possible by collation of results.

As control is achieved in the region, individual countries and blocks of countries will wish to declare themselves free of disease and ultimately free of virus. The OIE is at present preparing a set of guidelines for this process but central to this will be the cessation of vaccination and the use of routine sero-monitoring to detect sero-conversion in individual animals indicating the presence of disease and/or circulating virus. In the latter stages of the campaign therefore, sero-monitoring through ELISA will be used not to assess the vaccination programme, but to help ensure the disease-free and virus-free status of countries in the region.

(iii) Scientific Scope and Proposed Programme Goals

The primary aim of the programme is to support scientists in national laboratories to test cattle sera with the FAO/IAEA rinderpest

ELISA kit and to provide an interpretation of the results to national and regional rinderpest co-ordinators. At present, laboratories in the region have a varying capacity to achieve this and the programme will aim to establish a uniformity of approach and the required capability in these laboratories. In the long-term, this capability will also ensure that individual countries can meet the international requirements of routine sero-monitoring central to the declaration of freedom from the disease.

These general objectives will be achieved through the provision of suitable equipment and reagents, through the development of further computer support packages and through the introduction of appropriate epidemiological approaches. Technical support and back-stopping will be extensively available to institutes and scientists in the programme and assistance will be provided in conveying the results of sero-monitoring not only to national co-ordinators but also to the PARC epidemiological team in Kenya.

Under the programme, the following will be undertaken:

- the provision of FAO/IAEA rinderpest ELISA kits to scientists in the programme
- the routine use of an assay quality control scheme
- the introduction and routine use of computer-based data management packages
- the development and use of appropriate sampling techniques to ensure acceptability of the results at the international level
- the development and subsequent establishment of "serum banks" in sero-monitoring laboratories
- the introduction of kit-based ELISA systems for studies on other disease through examination of sera collected under the rinderpest programme.

Under the initial 5-year CRP scientists from many countries in the region were introduced to the ELISA concept and the assay was developed and established in their national veterinary laboratories. This follow-up CRP aims at establishing and using as routine this ELISA system for sero-monitoring. It will be concerned not only with the introduction of the technique but also with the use of it as a tool for sero-monitoring. In effect therefore it will be concerned with the epidemiological exercise of evaluating vaccination campaigns and subsequently determining if eradication has been achieved and maintained. This in turn means that the new programme is concerned primarily with ELISA data generation and interpretation.

## 2. PROGRAMME 2

(i) Title of Programme: Immunoassay Methods for the Diagnosis and Epidemiology of Animal Diseases in Latin America

(ii) Background

For the past 4 years, the Animal Production and Health Section of the Joint FAO/IAEA Division has supported a small number of Research Contracts and organised several training activities in the Latin American region involving the use of ELISA and DNA probe methods in animal disease

diagnosis. Over the next 5 year period, and through support provided by SIDA and the IAEA's own Department of Technical Cooperation, a substantial expansion of these activities is expected. Support to Latin American institutions will focus on staff training through Technical Cooperation projects which provide fellowships and visits by field experts, as well as equipment. Research Contracts offering the opportunity of more modest financial support as well as funds for the attendance of principal investigators at Research Coordination Meetings will also be available. In most cases, it is expected that work under Research Contracts will be closely linked to that conducted under Technical Cooperation projects so that the different avenues of FAO/IAEA support can be used in a complementary fashion to achieve project objectives.

This new Latin American regional effort will commence in January 1991, but in view of the high demand expected from national institutes for support, we wish to start planning now and to decide upon the award of Research Contracts before the end of 1990. (Decisions concerning the award of Technical Cooperation projects are now being made and we can consider no further applications for this type of support at the present time).

The award of Research Contracts will be based entirely on the quality of the proposals we receive. However, for this programme we must also stipulate the scope of the diseases to be covered. Top priority will be given to three diseases, i.e. foot-and-mouth (FMD); tick-borne diseases (particularly babesiosis); and brucellosis. These are the diseases which impact most negatively on livestock production in the region, and they are also diseases which are amenable to diagnosis using ELISA methods. Under the programme, we expect to award 5-6 Research Contracts for the study of each disease and in this way to ensure that a "critical mass" of institutes and scientists are involved. Subject to the availability of sufficient funds, and subject to receipt of sufficient numbers of quality proposals, we will also consider the award of Contracts on leukosis, bluetongue, IBR and Aujeszky's disease. However, it must be emphasised that such proposals will be given second priority.

We will also consider carefully the type of institution from which the proposals are sent. This means that priority will be given to support of those laboratories which have a national mandate to investigate or control animal diseases. Institutes with a purely research mandate will have second priority. We have made this decision for a number of reasons. Firstly, to conduct the work envisaged (see below), access to large numbers of animals or samples is absolutely essential. Secondly, since standardised FAO/IAEA reagents will be provided for each disease, we are not interested in receiving proposals to develop specific tests or reagents. Rather, the aim is to use already developed tests, validate these against existing methods (e.g. complement fixation, AGID) and then use them to monitor control programmes or to conduct epidemiological studies. Thirdly, while we wish to help establish ELISA initially for one specific disease in a given institute or laboratory, we also want to ensure where possible that the equipment, training and some of the reagents provided can be used for other diseases also. Thus, we wish to support where possible institutes with as wide as possible a mandate for animal disease diagnosis/control.

These points should be carefully considered by all institutes/scientists intending to apply for Research Contracts under this programme.

(iii) Scientific Scope and Proposed Programme Goals

As described above, the primary aim of this programme is to establish or strengthen the capability of institutions in the Latin American region involved in animal disease diagnosis, epidemiology and control to use ELISA methods within the context of their activities. Top priority will be given to proposals seeking to achieve these aims for FMD, babesiosis and brucellosis, but we may consider also proposals for leukosis, bluetongue, infectious bovine rhinotracheitis and Aujeszky's disease.

In each case, the work proposed to be conducted under each Contract should follow a logical sequence:

- establishment of a properly catalogued bank of serum or other relevant material (e.g. epithelial suspension).
- comparison of the ELISA test against existing methods (e.g. complement fixation, virus neutralisation, AGID, etc) for sensitivity, specificity, etc. Included in this would be examination of day-to-day variation, establishment of positive-negative "cut-off" values, etc.
- use of the fully validated test for diagnosis (including typing for FMD), monitoring the effectiveness of control programmes, or conducting epidemiological studies on the diseases concerned.

To assist in the achievement of these objectives, and in addition to providing relevant training and equipment, the following will be made available to contract holders:

- ELISA kits/reagents and protocols for each disease
- a quality control scheme
- computer-based data management packages
- other technical advice (e.g. appropriate sampling methods, analysis of data).

(iv) Programme Management

On the basis of technically-sound proposals from institutions in the regions concerned, Research Contracts will be awarded for an initial period of 1 year. These contracts will be renewable for a total period of 5 years subject to satisfactory progress being made during each contract period. Research Contracts provide modest financial support (around \$ 5,000/year) to follow an agreed work plan, and are awarded on a cost-sharing basis, i.e. the institutes concerned also provide support to achieve the project's objectives. In addition to Research Contracts (which are only awarded to research institutes within the regions), Research Agreements will be awarded to research institutes with special expertise in the area of disease diagnosis and control. Research Agreements do not provide financial support, but holders participate in exchange of information and will be invited to attend Research Co-ordination Meetings to assist Contract holders in preparing work plans, solving methodological problems and analysing data.

The programmes in Africa and Latin America will each provide about 24 institutes with Research Contracts and 3-5 institutes with Research Agreements. The selection of all participants will be made by

staff of the Joint FAO/IAEA Division's Animal Production and Health Section, upon receipt of completed Contract and Agreement proposal forms. However, the final approval of all contracts rests with the Director General of IAEA.

Research Co-ordination Meetings will be held at the beginning of each programmes and thereafter at intervals of approximately 12 months. Such meetings will have the effect of encouraging close contact and information exchange between scientists and institutes involved, as well as ensuring a uniform approach to the problems concerned.

Applications are now invited for these programmes. Please note that proposals should be countersigned by the Head of the Institution and sent directly to the IAEA; they do not normally need to be routed through other official channels. Remember the deadline! - 30 November 1990.

(E) DEVELOPMENTS AT THE SECTION'S LABORATORY UNIT, SEIBERSDORF

(i) Animal Production

Classical nutritional work on-feed evaluation and formulation testing using the Rumen Simulation and Tilley and Terry in vitro techniques have been discontinued for the time being.

In their place, effort has concentrated on the development of appropriate methodologies for measuring nutritional metabolites. This development is in support of our more integrated approach to livestock production research as explained in previous editions of the Newsletter. Thus, an attempt will be made to provide counterpart laboratories with kits to enable them to measure metabolites in blood and milk which may reflect the nutritional status of livestock; when this information is used in conjunction with classical production and reproduction data as well as progesterone and thyroid hormone levels, it may help the researcher to identify nutritional constraint(s) to productivity and thereby form a basis for assessing feed supplementation strategies.

So far, the laboratory has tested 'kits' for determining albumin, total protein, blood urea nitrogen (BUN) and phosphorus in blood. All these determinations are based on simple colorimetry. The 'kits' that remain to be developed and tested are those for iodine (in milk and blood), and beta-hydroxybutyrate. We will also be preparing protocols for measuring blood PCV levels and monitoring helminth and protozoal infections. The development of these kits is being conducted in collaboration with the Veterinary Faculty, University of Utrecht, The Netherlands. We envisage that much of this work will be completed by the time the next Newsletter reaches you but validation of the usefulness of the methods will take substantially longer. This will be done through contracted research in developing countries and under conditions of substantial seasonal fluctuations in feed availability and/or quality.

In addition to the above, a number of important modifications have been made to the FAO/IAEA progesterone RIA kit. These include the inclusion of liquid standards of plasma progesterone (in place of freeze-dried samples) and the discontinuation of providing separate internal quality control samples (IQC). In place of the IQC samples we

now include external quality control (EQC) samples which can be used both for internal quality control purposes as well as for completing the external quality control exercises run from Seibersdorf. EQC exercises will now be conducted three times per year (i.e. every other shipment) and not twice per year as before. The response to these EQC exercises so far has been somewhat discouraging; on average we receive about a 60% response. Of these around 95% of the reported values are within 2 SD's of the mean i.e. only about 5% of the values are outside acceptable limits. Thus, despite the rather disappointing response, the kits themselves seem to perform very well in the hands of collaborating scientists from over 50 counterpart countries.

The laboratory has also recently completed the validation of solid phase non-extraction assays based on  $^{125}\text{I}$  for the determination of tri-iodothyronine (T3) and thyroxine (T4) in the blood of domesticated livestock, i.e. cattle, sheep, goats, camelids, buffalo and horses. These assays are now available in kit form from the laboratory (price about US\$ 45/100 tubes) to project counterparts whose protocols involve study of such hormones.

The development of an RIA kit for measuring total oestrogens in the blood of domesticated livestock is continuing. This work is being conducted in collaboration with colleagues at the Veterinary University of Vienna and the University of Florida, Gainesville. Also underway is another attempt at developing a 'self-coating' RIA for progesterone using either monoclonal or polyclonal antibodies in solid-phase systems.

(ii) Disease Diagnosis

A quality control service for the FAO/IAEA ELISA kit used for rinderpest sero-monitoring in Africa was introduced at the beginning of this year. It was hoped that results from this service would have been received from all participating laboratories (21 in all) by the end of March. Unfortunately, results have only been received so far from 10 laboratories. We are awaiting the results from the remaining 11 laboratories after which we will be able to evaluate both the performance of our test and our counterpart laboratories.

At present, the FAO/IAEA/WHO brucellosis kit is being validated by laboratories in Europe and the United States for adoption as the international procedure for the detection of antibodies to brucellosis in cattle using ELISA. During a WHO-sponsored meeting in February, it was agreed that the FAO/IAEA Laboratory will act as a reference laboratory with respect to the immunological aspects of locally-produced antigens for use in the brucella ELISA.

A Rift Valley Fever ELISA kit has been tested in the field in Mali and based on this experience we have made some minor adjustments to the kit and it will be used again in Senegal in September. This kit is clearly still in the validation phase and as such is not generally available to our counterparts.

In collaboration with ILRAD we have modified the contents of our manual for the FAO/IAEA/ILRAD trypanosomiasis ELISA kit to address the changes in composition and concentration of several kit components. Within the next few months, Dr. V. Nantulya, our Research Agreement holder at ILRAD, will start to supply samples to the programme participants which will be used in an external quality control service (EQCS). This EQCS will enable us to compare the reproducibility and sensitivity of the kit.

The FAO/IAEA infectious bovine rhinotracheitis kit, being developed in collaboration with Dr. R. Jacobson (Cornell University, Ithaca, USA), has entered its final phase of development. Dr. Giovanni Re who has been undertaking the development of this kit will visit Mali next September to field validate the assay, and we expect to have a standard and reliable assay by the end of this year.

At this moment, a recombinant antigen is being tested by Dr. I.G. Wright for use in a Babesia bovis ELISA test, and his research group at CSIRO, Long Pocket Laboratories, Australia. We expect to incorporate this new antigen in our assay system by the end of this year, enabling us to start the validation of this modified test.

Several countries have requested us to provide them with ELISA kits for the detection of antibodies against Newcastle Disease virus (NCDV), infectious bronchitis virus (IBV) and infectious bursitis disease virus (IBDV - Gumboro Disease). At the moment, ELISA kits for all three diseases are being tested in the field on a small scale. We hope that further validation and evaluation will enable us to supply counterparts with sensitive, specific and robust ELISA kits by the beginning of next year.

As far as the future is concerned, the FAO/IAEA Laboratory will become involved in the development, adaptation and validation of enzyme immunoassays for the diagnosis of foot-and-mouth disease (FMD), bluetongue and contagious bovine pleuropneumonia (CBPP). These tests will be developed in close collaboration with laboratories in the U.K., France, Australia and the U.S.A.

(iii) Training

During this year, the following IAEA fellowship holders have received training in the Animal Production Unit Laboratory at Seibersdorf:

Ms. Shelton Mariga, Zimbabwe	- RIA/EIA progesterone
Ms. Celeste Cardoso, Portugal	- RIA/EIA progesterone
Ms. Mimoza Dervishi, Albania	- RIA/EIA progesterone
Mr. Augustine Kalimba, Tanzania	- RIA progesterone
Mr. Darko Majnaric, Yugoslavia	- RIA progesterone
Ms. Mona Abbas, Ghana	- ELISA disease diagnosis

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(E) PUBLICATIONS

(i) As announced in the previous edition of the Newsletter, the results of two FAO/IAEA activities were recently published, i.e. "Feeding Strategies for Improving Productivity of Ruminant Livestock in Developing Countries", and "Livestock Reproduction in Latin America". Shortly, the results of two further recently completed Coordinated Research Programmes will be published by the IAEA. Details of these publications, which will be available from the IAEA's Division of Publications by the end of July, (price: approx. Austrian shillings 500.-- and 620.-- respectively, paid in convertible currency or UNESCO coupons) are as follows:

(i) Radioimmunoassay for Improving the Productivity of Ruminant Livestock

CONTENTS

<u>Title of Paper</u>	<u>Authors</u>
Factors affecting the reproductive potential of dairy cows.	Y. Folman, M. Rosenberg M. Kaim (Israel)
Studies on the post-partum acyclicity of the Alentejano beef cows.	A.E.M. Horta, M. Irene Vasques, R.M. Leitao, J. Robalo Silva (Portugal)
Post-partum reproductive performance of the Icelandic dairy cow.	J. Eldon, Th. Olafsson, Th. Thorsteinsson (Iceland)
Monitoring reproductive performance of cross-bred dairy cattle on smallholder farms in Malaysia.	W. Sharifuddin, M.R. Jainudeen, K. Azizuddin (Malaysia)
The age at puberty of Nganda cattle under traditional and improved management conditions in Uganda.	L. Miyingo-Kezimbira (Uganda)
Sexual behaviour in cattle.	G.J. King (Canada)
Oestrus detection and reproductive performance of cattle in Sri Lanka.	A.R. Mohamed, R. Sivakanesan, R. Rajamahendran (Sri Lanka)
Milk and serum progesterone assay for evaluation of reproductive performance of dairy herds in Thailand.	Y. Intraraksa, K. Nitichai, S. Aiumlamai (Thailand)
Endocrine evaluation of puberty and post-partum ovarian function in indigenous and imported Brahman cattle.	H.S. Tan, K.H. Ismaya, A. Sulong (Malaysia)
Radioimmunoassay of milk progesterone to monitor reproductive performance in smallholder dairy herds in Indonesia.	L. Mahaputra, M. Hariadi, S. Hardiopranjoto (Indonesia)
Preliminary results of the use of radioimmunoassay to monitor reproductive performance of dairy and beef cattle on Cheju Island, Korea.	G.C. Dominicus Choung (Korea)
Short-term calf removal to improve conception rates in Angoni cows.	J.A.S. Chipepa, M.A. Omar, G. Nsofwa, R. Changa, C. Sianangama (Zambia)
Diseases and impaired reproductive performance in ruminants.	H. Kindahl, G. Fredriksson, S. Aiumlamai, K. Odensvik, L.-E. Edqvist, G. Stabenfeldt (Sweden)



(ii) The Use of Nuclear Techniques to Improve Domestic Buffalo Production in Asia - Phase II

CONTENTS

<u>Title of Paper</u>	<u>Authors</u>
<u>Nutrition:</u>	
Development of feeding strategies for improving milk production in India from Milch animals owned by small-farmers.	R.A. Leng (Australia), P.J. George Kunju (India)
Digestion and passage of tropical forages in swamp buffaloes and cattle.	P.M. Kennedy (Australia)
The productivity of Indonesian swamp buffaloes in relation to nutrition, reproduction and draught use in the wet tropics.	A. Bamualim, C. Liem, D. Foulkes (Indonesia)
Effect of non-protein nitrogen and fodder legumes on intake, digestibility and growth of buffaloes.	Sujatha Premaratne (Sri Lanka)
Utilisation of by-products and locally available feedstuffs in buffalo rations in Bangladesh.	M.A. Akbar, A.M. Tareque (Bangladesh)
Comparative studies of fibre digestion in cattle and buffaloes.	N. Abdullah, Y.W. Ho, M. Mahyuddin, S. Jalaludin (Malaysia)
<u>Reproduction:</u>	
Studies on growth and reproduction of cattle in the tropics.	J.E. Frisch (Australia)
Embryo transfer technology in the buffalo: a review.	M.R. Jainudeen (Malaysia)
Behavioural and hormonal aspects of the oestrous cycle in swamp buffaloes reared under temperate conditions.	Y. Kanai, T. Abdul Latief, N. Ishikawa, H. Shimizu (Japan)
The influence of nutrition and suckling patterns on post-partum cyclic activity in swamp buffalo.	W. Wongsrikeao, L. Boon-Ek, M. Wanapat, S. Taesakul (Thailand)
A pilot village study to improve Philippine swamp buffalo production using nuclear techniques.	A.L. Alejandrino, J. Alcantara, S. Eduardo, B. Mateo, R. Dayrit, C. Goze, C. Oprenario, J. Sevilla, L. Ignacio, S. Lucas (Philippines)
Trends of advanced reproductive management using hormonal radioimmunoassay in swamp buffaloes.	M. Kamonpatana, C. Pansin, S. Sophon, R. Parnpai, S. Sravasi, K. Srisakwattana (Thailand)

Reproductive responses to climatic heat induced by management systems in swamp buffaloes.	M.A. Dollah, N. Ramakrishnan, Y. Nordin, R. Abdullah Sani (Malaysia)
Increasing the productive efficiency of carabaos under smallholder farming systems.	V.G. Momongan, A.S. Sarabia, N.P. Roxas, O.A. Palad, A.R. Obsioma, Z.M. Nava, A.N. Del Barrio (Philippines)
The use of milk progesterone for determining the reproductive status of cross-bred swamp buffaloes and cattle.	L. Xuan Cuong, Cao van Trieu, Tran Tich Canh, Luu van Tan, Chung Anh Dung, Vuong Dac Quynh (Vietnam)

Diseases:

Studies on the epidemiology of <u>Trypanosoma evansi</u> in buffaloes in Indonesia.	R.C. Payne, S. Partoutomo, I.P. Sukanto (Indonesia)
Epidemiological investigation on rotavirus infection in buffalo calves in Bangladesh.	M.A. Samad, M.W. Ahmed (Bangladesh)
Gastrointestinal parasites and <u>Trypanosoma evansi</u> in buffalo.	R.A. Sani, P. Chandrawathani, M. Rosli (Malaysia)

(G) FORTHCOMING EVENTS

- (i) OIE/FAO/IAEA Meeting on the "Identification and Supply of Reagents for the FAO/IAEA Foot-and-Mouth Disease ELISA kits", Vienna, 17-18 September 1990

This meeting will involve consultants from the Foot and Mouth World Reference Laboratory, UK; the Pan American Foot and Mouth Centre, Brazil; OIE; FAO and IAEA. It will aim to define clearly the reagents and their supply for inclusion in the FAO/IAEA ELISA kits for both antigen and antibody identification. The kit itself will be based on the published protocols from the World Reference Laboratory but clarification on the actual reagents and their supply is required to ensure an efficient supply of this kit for new programmes on animal disease diagnosis commencing in 1991. It is anticipated that this meeting will pave the way for international acceptance of this kit for foot-and-mouth diagnosis.

- (ii) FAO/IAEA Regional Training Course on "Application of Immunoassay and Related Techniques in Studies on Animal Production and Disease Control in Asia", Jakarta, Indonesia, 24 September - 19 October 1990
- (iii) OIE/FAO/IAEA Meeting on "Use of Reagents in the Bluetongue Group Specific ELISA", Vienna, 15-16 October 1990

This meeting will involve consultants from the Australian Animal Health Laboratory; the Veterinary Research Services Laboratory, USA; the Animal Diseases Research Institute, Canada; the Pirbright Laboratories,

UK; OIE, FAO and IAEA. The purpose of the meeting is to define the Bluetongue Group Specific ELISA, the reagents for use in the test and the interpretation of the results. The assay is a competition ELISA and central to this is the use of a monoclonal antibody. Both Australia and UK have developed monoclonal antibodies for use in this ELISA and international agreement is required on which monoclonal antibody should be used to provide international acceptance.

- (iv) Second FAO/IAEA Research Coordination Meeting on "Development of Feeding Strategies for Improving Ruminant Productivity in Areas of Fluctuating Nutrient Supply through the Use of Nuclear and Related Techniques", Khon Kaen, Thailand, 22 - 26 October 1990
- (v) Final FAO/IAEA Research Coordination Meeting on "Regional Network for Latin America on Animal Disease Diagnosis using Immunoassay and Labelled DNA Probe Techniques", in conjunction with IFS/FAO/IAEA Workshop, Costa Rica, 22 October - 26 October 1990
- (vi) Final FAO/IAEA Research Coordination Meeting on "Sero-surveillance of Rinderpest and other Diseases in Africa using Immunoassay Techniques", Bingerville, Côte d'Ivoire, 19 - 23 November 1990
- (vii) FAO/IAEA Regional Training Course on "The Use of Immunoassay Techniques in the Diagnosis and Control of Animal Diseases in Africa", Bingerville, Côte d'Ivoire, 29 October to 23 November 1990
- (viii) FAO/IAEA Research Coordination Meeting on "Strengthening Animal Reproduction Research in Asia through the Application of Immunoassay Techniques", Manila, Philippines, 4-8 February 1991
- (ix) FAO/IAEA Research Coordination Meeting on "Strengthening Animal Disease Diagnosis in Asia through the Application of Immunoassay Techniques", Manila, Philippines, 4-8 February 1991
  
- (H) FAO/IAEA INTERNATIONAL SYMPOSIUM ON NUCLEAR AND RELATED TECHNIQUES IN ANIMAL PRODUCTION AND HEALTH, VIENNA, AUSTRIA, 15 - 19 APRIL 1991

#### INFORMATION SHEET

##### (i) Introduction

The efficiency with which animals are reared for the production of meat, milk, wool and other products is substantially lower in tropical and subtropical regions of the world than in temperate zones. There are a variety of reasons for this but essentially the lower productivity associated with tropical areas arises from high environmental temperatures and humidities; from seasonal variations in the availability and quality of feed; from a restricted water supply; and from a high prevalence and incidence of infectious and other diseases. Not all animals, however, are affected to the same extent by these constraints - in fact, some indigenous species and types of livestock not only survive and reproduce successfully, but actually produce substantial amounts of protein and by-products.

The key to improving the efficiency of animal production under tropical conditions is to have a clear understanding of the relationship between the animals and their environment and in particular to determine for each set of conditions the optimal combination of environmental adaptation and productivity. For many years, nuclear and other advanced techniques have played an important role in defining parameters of adaptation and productivity under temperate zone conditions, and such techniques are now being used in tropical zone countries where the requirement as well as the potential for increased animal productivity are fully recognised.

For the past 25 years the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture has actively supported research to quantify such functions as animal adaptation to harsh environments, the feeding of ruminants using lignocellulosic materials and agricultural by-products, reproductive efficiency, and resistance to disease and other forms of stress. This Symposium will provide a forum at which scientists from various disciplines will review the various ways by which nuclear and other methods can be used to evaluate methods to improve animal nutrition, reproduction and disease control under the different environmental conditions prevailing in the developing world.

(ii) Programme and List of topics

The focus of the Symposium will be the presentation and discussion of scientific results on the topics listed below, in the form of paper and poster presentations. In addition, sufficient time will be available for participants to exchange information during poster sessions.

List of topics

(a) Animal Nutrition

- Role of tracer techniques in animal nutrition studies.
- Evaluation of feed resources for ruminants.
- Evaluation of the protein and energy status of ruminants.
- Nutritional strategies for the better utilisation of crop residues and non-conventional feedstuffs in the developing tropics.
- New approaches to the manipulation of rumen fermentation and other processes to enhance animal productivity.
- Biodegradation of lignocellulose.
- Diagnosis of macro- and micro-element imbalances and strategies for correction.

(b) Animal Reproduction

- Immunoassay techniques: current status and future trends in hormone assay methodology and their relevance to developing countries.
- Applications of hormone determinations for studies on improving reproductive efficiency of livestock.

- Potential uses of recombinant DNA techniques in animal breeding.
- Genotype x environment interactions with particular reference to effects of temperature, management, nutrition and disease on reproductive efficiency.
- New approaches to enhancing fertility of ruminants.

(c) Animal Diseases

- Disease diagnosis and surveillance by immunoassay techniques.
- Recombinant DNA technology in diagnosis and vaccination.
- Genetic resistance to disease-causing organisms.
- Systems for evaluating interactions between nutrition, disease and reproductive efficiency.
- Appropriate epidemiological approaches in developing countries for animal disease diagnosis and control.

(iii) Participation

All persons wishing to participate in the meeting are requested to complete a Participation Form (see attached Form "A") and send it as soon as possible to the competent official authority (Ministry of Foreign Affairs, Ministry of Agriculture, national atomic energy authority, or national FAO committee) for subsequent transmission to the Joint Secretariat. A participant will be accepted only if the Participation Form is transmitted through the Government of the Member State of the Food and Agriculture Organization of the United Nations or the International Atomic Energy Agency, or by an organization invited to participate.

Participants, whose designations have been received by the Joint Secretariat, will be notified directly about two or three months before the meeting.

(iv) Visas

Designated participants who require a visa to enter Austria should submit the necessary application to the nearest diplomatic or consular representative of Austria as soon as possible.

(v) Expenditures

As a general rule, the sponsoring organizations do not pay the cost of attendance, i.e. travel and living expenses, of participants. However, limited funds are available to help meet the cost of attendance of selected participants mainly from developing countries with low economic resources. Generally, not more than one grant will be awarded to any one country.

If Governments wish to apply for a grant on behalf of one of their nationals, they should address specific requests to the Director

General of the International Atomic Energy Agency to this effect. Governments should ensure that applications for grants:

- (a) be submitted by 15 October 1990
- (b) be accompanied by a duly completed and signed Grant Application Form (as attached).

Applications which do not comply with the conditions mentioned under (a) and (b) cannot be considered.

The grants awarded will be in the form of lump sums usually covering part of the cost of attendance.

The costs for the organization of the meeting are borne by the sponsoring organizations.

No registration fee is charged to participants.

(vi) Papers and Posters

All papers and posters - apart from invited review papers - must present original work; they should not have been published elsewhere.

Deadlines for submission

- (a) A completed Form for Submission of a Paper (Form "B"), together with the Participation Form (Form "A") and six copies of an extended synopsis of 800 words (i.e. two A4 format pages of single-spaced typing or the equivalent, including any tables or diagrams and a few pertinent references) must be sent to the competent official authority for transmission to the Joint Secretariat to reach it by 15 October 1990. (see section 12 below).

The synopsis should give enough information on the contents of the proposed paper to enable the selection committee to evaluate it. Introductory and general matters should not be included. The synopsis - if accepted - will be reproduced in unedited form in the Book of Extended Synopses; therefore, the original must be submitted as cameraready copy. The general style and presentation should be as in the attached sample.

- (b) If changes or corrections of an extended synopsis become necessary, a revised version may be sent to reach the IAEA by 15 February 1991 for inclusion in the Book of Extended Synopses;
- (c) Six copies (including the master copy with original figures) of the full text of the presentation, preceded by an abstract of 300 words maximum, must be sent directly to the Joint Secretariat by 4 March 1991 for editorial purposes.

Authors are urged to strictly observe the deadlines as otherwise publication of their paper cannot be guaranteed.

### Paper acceptance

In order to provide ample time for discussion, the number of papers that can be accepted for oral presentation has to be limited. If the number of relevant and high quality papers submitted exceeds the number acceptable for oral presentation, poster sessions will be arranged.

Authors will be informed whether their papers have been accepted for oral presentation or for poster display on the basis of the submitted extended synopses. The sponsoring organizations however reserve the right to refuse the presentation or publication of any paper that does not meet the expectations raised by the submitted extended synopsis.

### Poster presentations

Authors whose papers have been accepted for poster presentation will receive instructions for the preparation of the poster, both as regards display during the symposium and the subsequent form of publication. An abstract of 300 words maximum will be published in the proceedings.

#### (vii) Proceedings

The proceedings of the meeting will be published by the International Atomic Energy Agency as soon as possible after the meeting. They will include all papers presented, printed in full in the language of submission, together with abstracts in the original language and in English. In addition they will include abstracts of 300 word of poster presentations. With a view to speeding up publication of the proceedings and reducing its costs, the length of the papers will be strictly limited.

Participants who order copies of the proceedings in advance during the meeting will be entitled to a 50% discount.

#### (viii) Working languages

Working languages of the meeting will be English, French, Russian and Spanish. All communications, synopses, abstracts and papers must be sent to the Agency in one of these languages. However, as many readers of these papers find difficulty in reading a language other than English, authors may wish in their own interest, to provide an English version of their papers for publication, even if they wish to orally present their work in another official language.

Simultaneous interpretation may be provided between all the working languages if six weeks before the meeting it is seen from the Participation Forms received that these are required.

#### (ix) Distribution of documents

A preliminary programme of the Symposium will be sent to the participants before the meeting.

The final programme, the book of extended synopses in the original language and preprints, to the extent available, will be distributed on registration.

(x) Accommodation

Detailed information on accommodation and other items will be sent direct to all designated participants well in advance of the meeting.

(xi) Joint Secretariat

The address of the Joint Secretariat is:

International Atomic Energy Agency  
SM-318  
Vienna International Centre  
P.O. Box 100  
A-1400 Vienna  
Austria

Telephone No.: Austria - 1 - 2360(0) plus extension  
Telex No.: 1-12645  
Telefax No.: 43 1234564  
Cable address: INATOM VIENNA

The Scientific Secretary of the symposium is Mr. J. Dargie, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture (telephone extension 6053). Meeting organization is provided by Ms. T. Niedermayr, Conference Service Section, Division of External Relations (telephone extension 1312/1311).

(xii) Channels of communication

The Participation Form and the Form for the Submission of a Paper, together with six copies of each synopsis, should be sent to the competent official authority (Ministry of Foreign Affairs, Ministry of Agriculture, national atomic energy authority or national FAO committee) for subsequent transmission to the Director General of the International Atomic Energy Agency.



**FORM A**

**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
INTERNATIONAL ATOMIC ENERGY AGENCY**

**International Symposium on Nuclear and Related Techniques in  
Animal Production and Health**

Vienna, Austria  
15 - 19 April 1991

To be sent to the competent official authority (Ministry of Foreign Affairs, Ministry of Agriculture, national atomic energy authority or national FAO committee) for transmission to the Joint Secretariat of the Symposium, c/o International Atomic Energy Agency, P.O.Box 100, Vienna International Centre, A-1400 Vienna, Austria

**PARTICIPATION FORM**

Family name:		All initials of given names:		Mr. Ms.
Institution:		Full address:		
		For urgent communications please indicate: Telefax No.: Cable address: Telex No.:		
Nationality:	Designating government or organization:			
Mailing address (if different from address of institution):				
Date of departure from mailing address:				

Indicate below in which of the meeting languages you are able to follow the proceedings of the meeting and in which language(s) you can express yourself:

Language	English	French	Russian	Spanish
Speaking				
Understanding				

Do you intend to present a paper?	YES <input type="checkbox"/>	NO <input type="checkbox"/>
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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
INTERNATIONAL ATOMIC ENERGY AGENCY

**FORM C**

International Symposium on Nuclear and Related Techniques in  
Animal Production and Health

Vienna, Austria  
15 - 19 April 1991

To be sent to the competent official authority (Ministry of Foreign Affairs, Ministry of Agriculture, national atomic energy authority or national FAO committee) for transmission to the Joint Secretariat of the Symposium, c/o International Atomic Energy Agency, P.O.Box 100, Vienna International Centre, A-1400 Vienna, Austria

**GRANT APPLICATION FORM\***

Name: (Mr/Ms)

Mailing Address:

Telex No.:

Telefax No.:

Telephone:

Cable address:

Date of Birth (Year/Month/Day):

Nationality:

1. EDUCATION (Post-Secondary)

Name and place of institution	Field of study	Diploma or degree	Years attended	
			from	to

2. RECENT EMPLOYMENT RECORD (Starting with your present post)

Name and place of employer/organization	Title of your position	Type of work	Years of service	
			from	to

3. DESCRIPTION OF WORK (Performed over the last three years)

.....

4. INSTITUTE'S/MEMBER STATE'S PROGRAMME IN FIELD OF MEETING

.....  
Date

.....  
Signature of Applicant

.....  
Date

.....  
Name and title (printed) and signature of  
responsible Government official

\* To be completed only by participants from developing countries on whose behalf a grant is requested.

Animal Production and Health Newsletter

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in Food and Agriculture  
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