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CONTENTS

TO THE READER 2

FAO/IAEA SEMINAR FOR LATIN AMERICAN COUNTRIES ON NUCLEAR TECHNIQUES IN ANIMAL PRODUCTION AND HEALTH 4

FAO/IAEA RESEARCH COORDINATION MEETING ON SHEEP AND GOAT PRODUCTIVITY . 5

FAO/IAEA RESEARCH COORDINATION MEETING ON MEDITERRANEAN ANIMAL PRODUCTION 5

FAO/IAEA INTER-REGIONAL TRAINING COURSE ON ISOTOPE METHODS IN RUMINANT NUTRITION 7

FAO/IAEA RESEARCH COORDINATION MEETING ON PARASITIC DISEASES 8

FAO/IAEA/SIDA RESEARCH COORDINATION MEETING ON DIAGNOSIS OF ANIMAL DISEASES USING IMMUNOASSAY TECHNIQUES 9

STATUS OF EXISTING COORDINATED RESEARCH PROGRAMMES 9

NEW COORDINATED RESEARCH PROGRAMMES ON ANIMAL REPRODUCTION AND DISEASE DIAGNOSIS 11

PUBLICATIONS 15

NEW LITERATURE SEARCH SERVICE 17

DEVELOPMENTS AT THE SECTION'S LABORATORY UNIT, SEIBERSDORF 18

FORTHCOMING EVENTS 19

Dear Colleague,

Since the last edition of the Newsletter, a Regional Seminar for Latin American scientists, 4 Research Coordination Meetings and an Inter-Regional Training Course on Animal Nutrition have been organised by the Section, bringing together over 150 scientists from developing and developed countries. Organising and running these and other such events is of course a particularly important part of the Section's activities because it is through such meetings that direct exchange of information and ideas takes place between staff of the Section and our collaborating institutes. It is, in effect, at Research Coordination Meetings where the work plans for each Research Contract in our Coordinated Research Programmes are worked out; and at the Final Meeting of such programmes that the results are prepared for publication, and recommendations for future work made. It is at Seminars of the type recently held in Venezuela where scientists and scientific administrators new to the activities of the Joint FAO/IAEA Division come to know of these activities and how to get involved in them. And it is at Training Courses where researchers can get hands-on experience of using isotopic methods for examining animal production and health problems, and thereby the training to enable them to take part in Coordinated Research Programmes, Technical Cooperation projects and other activities operated by the IAEA and FAO.

We know from the feedback we get both from developing and developed country institutes that the impact of our activities goes beyond the individual staff member taking part as an investigator in one of our Coordinated Research Programmes or as a trainee in a particular Training Course, i.e. that there is an extension of knowledge and technology to, and use of equipment by, staff in other departments or nearby institutes. This is of course very gratifying and a trend which hopefully will continue, since it helps to limit duplication and thereby allows us to assist more institutes; it also indicates that greater efforts are now being made by institutes to involve staff of different disciplines in particular problems and thereby to look at animal production and health problems within the context of systems rather than focussing on one particular aspect of that system. Certainly we intend to direct an increasing proportion of our resources in the future towards research aimed at optimizing productivity of livestock systems, and particularly those practiced by small farmers. This means that much less funding will be available for work on animals kept on institute or university farms and more for studying animals in their natural environment.

In this respect, it will be noted from reading through this Newsletter that although 2 Coordinated Research Programmes (on Mediterranean animal production and parasitic diseases) have now been terminated, the Section is still operating 5 programmes involving over 100 Research Contracts and Agreements and has plans to award a further 40 or so Contracts in the 2 additional programmes now being launched in nutrition, reproduction and disease diagnostics. It is expected that these programmes will also be fully operational by the end of the year. In addition to this however, we intend to initiate two further programmes in 1988. These are both of a regional nature (i.e. for scientists and institutes in Asian and Mediterranean countries), and hopefully they will attract quality proposals for work on smallholder production systems and in disease diagnostics. Keeping the existing programmes running and getting the new ones off the ground will certainly keep us busy for the rest of this year - not to mention the next!

While on the subject of our Coordinated Research Programmes there are a number of points which we would like to make on the basis of recent experience with running two final Research Coordination Meetings. As those of you who have taken part in these meetings are well aware, apart from oral presentation of recent results, final RCMs are a forum for technically editing manuscripts describing results obtained under individual contracts over the 5-year lifespan of the Coordinated Research Programme in question. These manuscripts are supposed to be prepared in the form of a scientific paper (i.e. with introduction, materials and methods, results and discussion), and they should be comprehensive. We do give very clear guidelines well before the meeting on the format of the manuscripts. Despite this, about 10-15% of the papers we received for these two meetings as final reports were clearly last minute efforts, entirely unsuitable as they stood for publication and therefore demanding a tremendous amount of time and effort on the part of the Section's staff to put them into reasonable shape. We would like to make it clear that one of our tasks in the Section is to technically edit manuscripts - in fact, we invariably also do much correcting of the English ourselves and even arrange to get some manuscripts translated from other languages in order to improve the conformity of the subsequent publication. All these tasks we accept - and accept gladly when we see that a serious effort has been made by the author(s) concerned to adhere to the guidelines provided. What we will not accept, however, are carelessly-produced reports from people who should know better. In future, therefore, we aim to tighten up considerably on our reporting procedures for all Research Coordination Meetings (and not just for the final one!), and although advice can be given on manuscript preparation to those who need it, the very few individuals who don't conform to the procedures will be removed from our programmes at an early stage!

There are two further points which need to be made with respect to publications to recipients of FAO/IAEA funds - perhaps not obvious to those who are concerned only with doing research and with writing papers for international or national journals. Firstly, Agency publications help us to attract potential donor organisations to fund new programmes; and secondly we would be grateful if you would acknowledge the fact that the work was supported by the Agency. Every effort should therefore be made to make the work and the quality of its presentation as good as possible.

Finally, a few words on our laboratory activities at Seibersdorf. As you know, the Animal Production and Health Unit was set up about 3 years ago to improve the quality of the technical backstopping we provide to FAO/IAEA Contract holders and recipients of IAEA and FAO Technical Cooperation projects. Specifically, this has meant analytical services and standardised kits and reagents for hormone measurements and disease diagnostics. To get these laboratory activities operational from an infrastructural standpoint is one thing, but to establish the high technical capability needed to meet the particular requirements for developing countries is another. We feel we have succeeded in attracting good staff to Seibersdorf who in addition often serve as experts on FAO/IAEA projects. But we also know that to keep these activities operating effectively, strong links have to be established and maintained with scientists in institutes and organisations with long-standing experience of particular techniques and problems. In establishing our activities at Seibersdorf we have been impressed by the willingness and the enthusiasm with which assistance has been given to us when requested. In this respect we would particularly like to record our appreciation of the help provided in the form of staff training, specific reagents and

expertise we have received from the Directors and staff of the following institutes:

Agriculture Canada, Animal Diseases Research Institute, Ontario (Canada); Animal Virus Research Institute, Pirbright (UK); Centre of Tropical Veterinary Medicine, Edinburgh (UK); CSIRO Division of Tropical Animal Science (Long Pocket Laboratories), Queensland (Australia); International Laboratory for Research on Animal Diseases (ILRAD), Nairobi (Kenya); International Livestock Centre for Africa (ILCA), Addis Ababa (Ethiopia); National Veterinary Institute and the Biomedical Centre, Uppsala (Sweden); Research Institute for Animal Production "Schoonoord", Am, Zeist (The Netherlands); Veterinärmedizinische Universität, Wien (Austria).

With best wishes to you all,

James D. Dargie, Noble Jayasuriya, Martyn Jeggo
Ed Mather, Camille Ooijen, Stefan Oschmann,
Kees Plaizier, Wyn Richards

(A) PAST EVENTS

(1) FAO/IAEA Seminar for Latin America, Maracay, Venezuela, 2-6 March 1987

The FAO/IAEA Seminar for Latin America on Improving the Reproductive Efficiency and Health of Livestock through Radioimmunoassay and Related Techniques was held in Maracay, Venezuela, 2-6 March 1987. Participants from 15 countries attended the five day didactic seminar; including observers, almost 60 scientists took part. The seminar was opened by Dr. Carlos Arellano-Sota, FAO Regional Animal Production and Health Officer, Santiago and consisted of eight sessions: five on the employment of radio- and enzyme-immunoassay technologies (RIA and EIA) in animal reproduction, two on the use of immunoassay techniques in disease diagnosis, and one on the use of radioisotopes in studies of ruminant nutrition. Each session was opened by an invited specialist lecturer and followed thereafter by short papers on relevant topics and experiences of the regional participants. Ample time was allowed for questions and discussions after each of the 32 presentations. At the conclusion of the seminar, an open forum on the value of the meeting to the participants indicated:

(i) its unique success in bringing together veterinarians, animal productionists, physiologists, agriculturalists, immunologists, nutritionists, government administrators and international aid specialists with a common interest in improving the efficiency of animal production systems in Latin America;

(ii) its value in identifying the research institutes and scientists at the forefront of various animal production disciplines in the region;

(iii) its importance in defining the major problems limiting the development of animal production in the region and those which require immediate research effort;

(iv) its role in generating interest and awareness in matters pertaining to animal production in the region; and

(v) that by conducting the meeting in Spanish, the seminar enabled less inhibited communication between participants so providing a worthwhile forum of discussion.

The seminar was another planned activity of the ARCAL III programme in 1987.

(2) Second Research Coordination Meeting of FAO/IAEA Coordinated Research Programme on "Improving Sheep and Goat Productivity with the Aid of Nuclear Techniques", Serdang, Selangor, Malaysia, 23-27 February 1987.

The second RCM of this programme was held at the Universiti Pertanian Malaysia, Selangor and was attended by 14 research contract/agreement holders. The Agency would like to record its appreciation for the excellent arrangements made by Prof. Latif Ibrahim and his staff of the Faculty of Veterinary Medicine and Animal Science. The overall goals of this Coordinated Research Programme remain, in principle, as specified in the original programme proposal but through progress made during the programme, new research areas have been identified which require attention.

Among the achievements to-date are:

The establishment of the importance of indigenous types of small ruminants as a resource for the production of feed and fibre; the demonstration of the usefulness of treating poor quality roughage with urea to improve its nutritive value for feeding goats; the demonstration that the potential for growth of kids can be realised substantially by increasing the level of feeding prior to weaning; the demonstration of the usefulness of techniques such as early weaning and the "male effect" for improving the rate of reproduction of small ruminants; the establishment of the validity of measuring the concentration of progesterone by RIA and EIA in blood and milk for monitoring reproduction in small ruminants; and the identification of pseudo-pregnancy and pathological diseases as potential problems limiting productivity from goats.

After presentation of results obtained to date by each participant, new research plans were drawn up for each Contractor.

(3) Final Research Coordination Meeting of FAO/IAEA/Government of Italy sponsored Coordinated Research Programme on "Optimizing Grazing Animal Productivity in the Mediterranean and North African Regions with the Aid of Nuclear Techniques", 23 - 27 March 1987.

This was the final meeting of about 25 participants in a programme which began in 1982 through funds provided by the Government of Italy. It was extremely well organised by Dr. Lahlou-Kassi and his staff of the Department of Reproduction at the Institut Agronomique et Vétérinaire Hassan II in Rabat, and to these people and other Moroccan colleagues and friends, the IAEA is very grateful. Being a final meeting, much more time than usual was spent on manuscript preparation. As a result of this effort together with some subsequent work, it can be

reported that all the manuscripts have now been edited and that the full results of the studies conducted by each participant during the programme period should be published before the end of this year.

When this programme was initiated there was limited knowledge of the true relative merits of the different breeds of livestock in the region. Contract holders therefore had to start with an evaluation and comparison of breeds and more especially to establish appropriate methodology and techniques to choose among the breeds available. Surprisingly it was found that some breeds, despite being routinely confronted with the stress of drought and high temperature, were not well adapted to these conditions. Expansion of body water is a normal response to thermal stress and it was found that the less well adapted types exhibited a greater response. The degree of expansion of body water could therefore be used as a reference criterion of adaptation to thermal stress. It is however, a relatively difficult characteristic to measure and it is important to develop simpler criteria for use as field tests.

The use of tritiated water to assess water balance has been found to be useful in the assessment of the effectiveness of husbandry systems to meet the water requirements of pregnant and lactating ewes. Specific responses to dehydration could be the basis of evaluation of the suitability of particular stock to the extensive management practices needed to utilise the grazing reserves of the region.

In parallel with the development of new approaches to practice, the programme has also shown a clear requirement for basic knowledge of the efficiency of utilization of indigenous forages and other feedstuffs. It is apparent that at any given stage of maturity the metabolisable energy (ME) values of Mediterranean forages differs from that of their temperate equivalents. Not only is it important to evaluate local feeds, it is also necessary to assess the merits of regional by-products as supplements. Methods have been successfully established and in most cases there is clear agreement between *in vivo* metabolic studies using only small numbers of animals (5-10), results of *in vitro* methods, and those based on the use of nylon bags for *in sacco* evaluation. With specific regard to nutrition, existing feeding standards developed for temperate regions do not cover all the requirements of animals on low quality feeds. This has to be rectified in the context of integrated husbandry systems. Future progress is likely to be dependent on the better understanding of the interaction between plant resources and the microbiology of the rumen. This will require collaboration between scientists of disciplines ranging from agronomy to rumen microbiology. More effective rumen fermentation is the key to improved forage utilization.

Reproductive performance is clearly a key component of the productivity of animal husbandry systems. During the past five years contract holder have, for the first time, started to assemble sound basic information on the reproductive characteristics of indigenous species and breeds in their local environments. Once identified, isotope-based methods are highly relevant to define the reproductive characteristics of stock. These methods have been applied very effectively to the study of puberty, the *post-partum* interval and the seasonality of reproduction. This is a major achievement. For the first time it has been possible to study ovulation and infertility independently. In future it will be important to study the reasons for delayed resumption or delayed initiation of ovulation and conception. One particularly rewarding aspect of the programme has been the contribution of the work to the wider

understanding of reproduction. The peculiarities of the stock of the region have added a new dimension to scientific knowledge. This should not be underestimated as a means to ensure the long-term viability of research groups of the region.

The optimization of grazing systems depend not only on the choice of appropriate breeds, the development of appropriate nutrition and the establishment of high fertility, but also on the progressive and cumulative genetic improvements of chosen genotypes in their natural environments. Artificial insemination is a useful aid to genetic improvement where clearly superior types have been identified. The programme addressed this issue for Angora gaots in Turkey and the success of this serves as a model for other species and other circumstances.

With regard to genetic improvement, the basic knowledge established in the programme is poised to serve as a basis for the development of simple selection criteria and hence of more rapid genetic progress. The new progesterone assay based methods could significantly shorten the time taken to recognise stock with superior fertility. Equally, the physiological characteristics associated with tolerance to thermal stress enable adapted stock to be identified much more simply and rapidly than was possible hitherto. The application of methods such as these in a properly designed and conducted programme of genetic selection would dramatically accelerate genetic change and hence the contribution of genetic selection to the improvement of the productivity of stock in the grazing environment. For cattle and buffalo new technologies such as multiple ovulation and embryo transfer (MOET) could be relevant in certain circumstances to developing countries as they are not dependent upon sophisticated infrastructure. These methods demand a higher level of technical input than progeny testing but could be established more readily.

This programme has clearly demonstrated how important it is to both identify areas of science particularly relevant to the region, and to work with indigenous species and breeds.

(4) FAO/IAEA Interregional Training Course on "The Use of Isotope Aided Techniques in Ruminant Nutrition" - Animal Science Unit, Seibersdorf, Austria, 7 April - 8 May 1987.

This was the second Interregional Training Course in Ruminant Nutrition to be held at the Agency's laboratory in Seibersdorf. The course attracted over 110 applications from nearly 50 countries but due to limitations of finance, space and other facilities only 22 could be selected.

The course consisted of lectures, tutorials, practical exercises and research presentation seminars. The introductory lectures and tutorials dealt briefly with principles of radioactive isotope decay, procedures for counting beta and gamma emissions and safety aspects of handling radioactive isotopes. A series of lectures was given on rumen function and manipulation with particular reference to biochemistry and microbiology of the rumen, lignocellulose and protein digestion and principles of energy supply and transfer. As in the previous course, practical exercises were based on the rumen simulation technique (Rusitec) to measure various parameters such as feed digestibility, production of volatile fatty acids (VFA), fermentation gases and microbial biomass. Radioactive markers ^{14}C acetate and ^{51}Cr EDTA were used to measure the rate of production of VFA and rumen fluid volume, respectively. The

Dacron bag technique with rumen fistulated sheep was used to estimate the potential degradation of fibrous feedstuffs. The last four days were spent on presentation of the data obtained by each participant. All candidates who participated in and completed the training course were awarded a certificate.

We are very grateful to Dr. J.W.Czerkawski (U.K.) for performing the difficult task of course Co-Director, Drs. Peter Buttery, Bob Orskov and Christine Palmer (U.K.) and Dr. K.Buchtela (Austria) for undertaking the tasks of lecturing and assisting with the laboratory work during the course. We are also grateful to Professors Leibetseider and Baumgartner of the Veterinary School in Vienna for their valued collaboration, particularly for the provision of fistulated sheep and for arranging an excellent weekend visit to a number of farms in lower Austria. And last, but not least, none of it would have been possible without the following hard-working and lively group of participants:

Name	Country
Ms. Teresa Nalecz	Poland
Mr. Armando Camacho Peducasse	Bolivia
Mr. M.A. Akbar	Bangladesh
Mr. S.L.A. Raggi	Chile
Mr. Dario Cardenas Garcia	Colombia
Mr. Odi H. Diambra	Côte d'Ivoire
Ms. A.A. El-Faramawy	Egypt
Mr. J.E. Fleischer	Ghana
Mr. K.I. Mohmood Al-Mashhadany	Iraq
Mr. W.F. Lubbadeh	Jordan
Mr. M.A.B. Rajion	Malaysia
Ms. S.A. Scheffer de Rojas	Paraguay
Mr. Adnan Swaid	Syria
Mr. K.K. Pathirana	Sri Lanka
Mr. Ali Ihsan Gucus	Turkey
Ms. Pornsri Chairatanayuth	Thailand
Mr. A. Chermiti	Tunisia
Ms. D.E. de Lima Segui	Uruguay
Mr. F. B. Bareeba	Uganda
Mr. J.P. Perez Gavilan Escalante	Mexico
Ms. Zinash Sileshi	Ethiopia

(5) Final Research Coordination Meeting of FAO/IAEA Coordinated Research Programme on "Use of Nuclear Techniques in Study and Control of Parasitic Diseases of Farm Animals", Vienna, Austria, 4-7 May 1987.

This meeting was attended by 12 of the Research Contract/Agreement holders in the programme and held at the Headquarters of the IAEA in the Vienna International Centre. Arising from this meeting and the reports provided by participants unable to attend, it can be reported that through the programme significant progress was made towards:

(i) development of control procedures for schistosomiasis, echinococcosis, babesiosis and lungworm in livestock and domestic animals using irradiated parasites;

(ii) the control of Babesia infections in cattle and possibly sheep through the development of synthetic vaccines;

(iii) the development of sensitive and specific serological tests based on RIA and EIA techniques for babesiosis and anaplasmosis;

(iv) an understanding of the effects of gastrointestinal helminths on digesta flow and motility; and on the interaction between host nutrition and parasitism;

(v) an understanding of epidemiology of gastrointestinal helminths in cattle and sheep in several regions of the world.

After the presentation of results, considerable time was spent on the preparation and editing of manuscripts for future publication by IAEA.

(6) First FAO/IAEA/SIDA Research Coordination Meeting on "Improving the Diagnosis and Control of Infectious and Parasitic Diseases of Livestock in Developing Countries with the Aid of Immunoassay and Related Techniques, Uppsala, Sweden, 4-14 May 1987.

The first Research Coordination Meeting of this Swedish-funded programme on disease diagnosis was held at the National Veterinary Institute, Uppsala. Twenty-one of 23 Contract holders in the programme, 4 Agreement holders and several specialised lecturers attended the meeting. The programme is truly international with Contract holders coming from four different continents, Africa (10), Asia (2), Europe (1) and Latin America (10) but with a common theme of using the ELISA in disease diagnosis. Each participant gave an account of his/her work to-date, and a detailed account of the workplan to be followed for the coming 18 months. These presentations were interspersed with lectures on epidemiology (particularly sampling procedures), ELISA developments and assay validation procedures. The lectures on epidemiology were particularly successful with the use of modern statistically based approaches described in a form applicable to developing countries.

The RCM was followed by a three-day training workshop involving both practicals and lectures on monoclonal antibody production, dot blotting procedures, electrophorectic techniques and alternative ELISA tests.

The meeting was a considerable success because of the quality of the presentations by the participants, the relevance of the training component, and the superb hospitality of our Swedish hosts. In this last respect, the Agency would particularly like to thank Drs. B. Hurvell, J. Moreno-Lopez and B. Klingeborn for their efforts in making this meeting so successful.

(B) STATUS OF EXISTING COORDINATED RESEARCH PROGRAMMES

1. Application of Radioimmunoassay to Improving the Reproductive Efficiency and Productivity of Large Ruminants.

This programme, which has 13 Contractors and 4 Agreement holders will terminate during the first half of 1988 when the final RCM will be held and the results prepared for publication.

(2) Improving the Productivity of Sheep and Goats with the Aid of Nuclear Techniques.

No further awards can be considered for this programme which has 12 Contractors and 5 Agreement holders. The final RCM will be held in late 1988/early 1989.

(3) Regional Network for Improving the Reproductive Management of Meat and Milk-producing Livestock in Latin America with the Aid of Radioimmunoassay Techniques.

This programme currently has 20 Contractors and 4 Agreement holders, and we are not seeking further proposals. Arrangements are now being made to hold the final RCM in the latter part of 1988.

(4) Use of Nuclear Techniques to Improve Buffalo Production Asia - Phase II.

In this programme 15 Research Contracts and 6 Agreements have been awarded and we are not seeking any further proposals. The 2nd RCM will be held in Penang, Malaysia from 24-28 August. All participants have been informed of the detailed arrangements.

(5) Improving the Diagnosis and Control of Infectious and Parasitic Diseases of Livestock in Developing Countries with the Aid of Immunoassay Techniques.

This programme, which is funded by the Swedish International Development Authority (SIDA) has 23 Research Contracts and 4 Agreements; naturally we are not seeking any further proposals. The 2nd RCM of this programme will probably be held in Argentina towards the end of 1988.

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

This programme, which was announced in the last edition of the Newsletter, has attracted many proposals for Contracts. These have now been evaluated technically and 10 are being recommended for funding. In addition we are reserving about 5 places in the programme for participants of the recent FAO/IAEA Training Course on Animal Nutrition, which together with 3/4 Agreement holders will mean a full programme. Subject to availability of funds we hope to initiate this programme before the end of the year.

(7) Immunoassay Techniques to Improve Reproductive Efficiency and Health Status of Indigenous African Livestock.

The implementation of this programme has been made possible through the generous support of the Directorate General for International Cooperation of the Ministry of Foreign Affairs in the Netherlands. The current situation with respect to this programme is that we have now recommended 12 Research Contracts for funding in the field of animal reproduction and will make a further 3-4 awards in this area after an on-site inspection of facilities towards the end of September. Within the disease component, efforts are being concentrated on trypanosomiasis and the use of an antigen-detection system for monitoring and treating active infections. This component of the programme is being conducted in full collaboration with the International Laboratory for Research on Animal

Diseases (ILRAD) in Kenya which has kindly agreed to provide expertise and reagents for ELISA tests. Research Contracts in this area (we intend to award 8-10), will be recommended for funding towards the end of year when on-site inspection of facilities and discussions with potential counterpart institutes have been completed.

The first RCM of the programme will be held at the headquarters of the International Livestock Centre for Africa (ILCA) in Addis Ababa during March or April 1988 and will be followed by a Training Workshop on standardisation of animal productivity data. It goes without saying that the IAEA very much appreciates the ready willingness of ILRAD and ILCA to collaborate in this programme, which in addition to strengthening the research capability of many national African institutes should help to improve further the links between these institutes and the two international laboratories concerned with livestock production and health in the African continent.

(C) NEW COORDINATED RESEARCH PROGRAMMES

(1) Programme I:

A new Coordinated Research Programme focussing on animal reproduction and disease diagnosis in the Asian region and funded from the IAEA's Regular Budget will be initiated in early 1988. Proposals for Contracts should be sent to Ms. T. Benson, Head of the Contracts Administration Section of the IAEA before 11 December 1987.

(a) Title of the programme: Strengthening Animal Reproduction Research and Disease Diagnosis in Asia through the Application of Immunoassay Techniques.

(b) Scientific Background

Most livestock in Asia are owned by subsistence or small-scale farmers. Most of the animals are indigenous types which, although considered to be of inherently low productivity compared with temperate breeds, are nevertheless adapted to survive and produce in environments where exotic breeds have found it difficult or impossible to do so. These animals also provide the essential nutrition, employment, draught power, social status and income to millions of families and villagers in Asia. At the village level little has been done to improve the productivity of these livestock enterprises or to develop the indigenous breeds through selection of superior traits or for crossbreeding with exotic breeds to combine genetic adaptation and productivity.

The major factors which affect the productivity of livestock enterprises in Asia, as in other regions, are environmental stress, nutritional constraints (especially energy and protein deficits in the dry season), livestock management mal-practices (notably in reproduction and breeding), and diseases. There are three principal and inter-related ways of improving the productivity of indigenous livestock in Asia: (i) the provision of adequate nutrition throughout the year; (ii) the identification and amelioration of factors affecting the efficiency of reproduction; and (iii) the diagnosis and control of viral, bacterial and parasitic diseases endemic to the region which cause mortality, morbidity

and low productivity. Generally, insufficient basic information exists on how well indigenous breeds of livestock perform within the environments in which they exist and therefore an important pre-requisite to improving the Asian livestock situation must be the initiation of simple integrated studies on the reproductive efficiency, nutritional and disease status of different genotypes maintained in different environments.

Studies on livestock reproduction are greatly facilitated by utilising radioimmunoassay and related techniques because these enable the measurement of the hormones which control reproductive processes. Such measurements can be used: (a) to confirm oestrus; (b) to differentiate functional anoestrus from silent oestrus; (c) to differentiate non-pregnant from pregnant animals; (d) to monitor the response of animals to corrective therapy; (e) to monitor the onset of sexual maturity; and (f) in general, to detect sub-optimal ovarian and testicular function. The application of such techniques in conjunction with clinical and other data has particular relevance for studying and subsequently for improving the reproductive efficiency of indigenous breeds of livestock in Asia since changes in hormone levels (particularly progesterone) could be employed to identify the impact on ovarian activity of various nutritional and disease constraints. This would generate the basic information required to introduce more efficient breeding and/or disease control practices and to identify breeds with superior reproductive performance under given environmental conditions.

In the control of livestock diseases, a pre-requisite is the ability to diagnose and determine the prevalence of individual diseases. For the development of control programmes the prevalence and distribution of a particular disease must be established and this invariably means the use of a laboratory based serological immunoassay. These assays either involve detection of organism-specific antigens or an altered antibody status, and until recently have utilised such techniques as serum neutralisation, complement fixation, immunofluorescence and agglutination reactions. However, recently a single test, the enzyme linked immunosorbent assay (ELISA) has replaced all of these as the test of choice for many of the diseases being studied. Even newer, but equally useful is the radiolabelled DNA probe for antigen detection. Both these tests combine simplicity and low cost with speed and specificity. In this programme it is envisaged that these two techniques will act as a cornerstone in the diagnosis and investigation of major diseases in the area which will include foot-and-mouth disease, rinderpest, swine fever, Aujeszky's disease, brucellosis, babesiosis and trypanosomiasis. By providing information on the incidence and prevalence of these specific infections and on the variables which will influence control policies, this programme on disease diagnosis will greatly assist in the development of the livestock section in the region.

(c) Scientific Scope and Proposed Programme Goals:

The primary aim of the programme is to provide the basic technical information which can subsequently be used on the small farm level to institute low-cost management changes which will increase the productivity of livestock in the Asian region. Particular emphasis will be placed on the application of immunoassay techniques using radioisotopes and enzymes as markers coupled with conventional clinical methods to monitor the reproductive efficiency and disease status of different indigenous breeds of ruminant livestock. Specifically, information will be obtained on age at puberty, seasonality of breeding, parturition interval, impact of offspring rearing strategy on reproductive

performance, diagnosis of pregnancy and oestrus/anoestrus, and the role of animal diseases as constraints on productivity, including their effect on reproductive function.

This will be achieved both by strengthening the existing infrastructure for conducting immunoassays within the framework of on-going breeding and disease control programmes, and by transferring the capacity for conducting and applying such techniques into countries not yet utilising the technology. In effect, a "network" of institutes and laboratories will be established within the region in which individual contract holders will be carrying out projects aimed at problem-solving in these two areas. Contract holders will be encouraged to make use of the kits available both for disease diagnosis and hormone measurements supplied from the Section's laboratory at Seibersdorf and will be expected to participate in the External Quality Control Service operated by this laboratory.

Priority will be given to studies covering the following:

(i) Monitoring the reproductive performance (age at puberty, post-partum activity, open period etc) of indigenous breeds of livestock maintained under traditional management at the small farm level.

(ii) Examination of viable management practices (e.g. temporary or early weaning, selective introduction of male, nutrient supplementation with macro- and micro-nutrients) for reducing age at puberty and inducing early cyclic activity post-partum.

(iii) Determination of the prevalence of incorrect timing of inseminations and causes of embryonic mortality/abortion.

(iv) Examining the effect of stocking rate on overall productivity of small scale livestock enterprises.

For proposals covering disease diagnosis (regardless of disease(s) being investigated), the following should be given due regard:

(i) Validation of the standardized ELISA kit which will be supplied through the Seibersdorf Laboratory.

(ii) Comparison of this test with other currently employed test(s); establishment of negative population values, and if applicable, comparison of vaccinated or treated versus naturally infected animals.

(iii) Use of the ELISA in sero-epidemiological studies on a national/regional basis, due consideration being given for correct sampling protocols.

(iv) Formulation of viable control measures and assessment of their effectiveness using the ELISA.

(v) Use of DNA probes in antigen detection and its use in conjunction with the ELISA for disease diagnosis.

(2) Programme II:

It is anticipated that the programme described below will be funded by a donor Member State early in 1988. Proposals for contracts within this programme should therefore be sent to Ms. T. Benson, Head of the Contracts Administration by 11 December 1987 .

(a) Title of the programme: Establishment of a Unified Approach to the Diagnsosis of Animal Diseases in Mediterranean, Middle East and North African Countries through the Use of Nuclear and Related Immunoassay Techniques.

(b) Scientific Background:

Each country, both developing and developed within the above area has its own animal disease control procedures and legislation, and a large variety of tests are employed to implement and support these. Within and surrounding the area, the level of veterinary expertise and diagnostic support facilities vary considerably and the ability to diagnose and control disease outbreaks is often inadequate. The result is frequent outbreaks of certain diseases which are supposedly exotic to the area or to individual countries, with the resultant loss of trade, decreased animal production and political disquiet. In addition to the widespread prevalence of conditions such as brucellosis, leucosis, infectious rhinotracheitis and Aujeszkey's disease, exotic diseases such as African swine fever, bluetongue, rinderpest and contagious bovine pleuropneumonia occur periodically. Although the reasons for these outbreaks are complex and varied, there is no doubt that the problem will only be solved if disease surveillance in all countries of the region is improved. Paramount to this surveillance is rapid and accurate diagnosis and the ability to effectively serologically survey areas for particular diseases.

Until recently, diagnostic tests and immunoassays have involved such procedures as virus neutralisation, complement fixation, immunoflourescence, or gel diffusion. As with the previously described new programme it is envisaged that the ELISA combined with radiolabelled DNA probes can replace this plethora of tests to provide the level of simplicity and sensitivity required.

(c) Scientific Scope and Proposed Programme Goals:

The primary aim of the project is to improve the general standard of disease diagnosis within the area concerned, and thereby to assist in the development and improvement of measures (both technical and legislative) for the prevention and control of diseases of economic importance. This programme will be operated as a Co-ordinated Research Programme in which approximately 20 Institutes from the region will collaborate. These institutes will be awarded Research Contracts on a cost-sharing basis for the purchase of necessary equipment and reagents, and subject to satisfactory progress the Contracts will be renewed for up to a total of 5 years. In addition, Research Agreements which do not provide financial support will be awarded to Institutes in the more advanced countries of the region with expertise in the area of interest. Individuals and institutes awarded Agreements would be expected to assist with and review the work of the contract holders. Research co-ordination meetings will be held at the beginning of the programme and thereafter at intervals of approximately 15 to 18 months. Such meeting will have the effect of encouraging close contact and information exchange between the scientist and institutes involved, as well as a uniform approach both to

the development and practical utilisation of DNA probes and immunoassay techniques.

To support the programme standardised reagents and tests will be provided through technical contracts awarded to two Institutes within the area and a quality control service involving reagent testing and distribution would be operated by the Section's laboratory at Seibersdorf. In addition, a training course will be held in 1988, in ELISA and DNA probe techniques for those contract holders involved in the programme.

It is anticipated that this approach will produce a standardisation and improvement in animal disease diagnsosis in the region as a whole. This can then result in the production of regional disease control legislation based on accurately obtained diagnostic and surveillance data and utilising procedures which each national laboratory can carry out. This will lead to improved animal health and production in the area through reduction in exotic disease outbreaks and improved animal movement control.

For all proposals the following should be the focus:

(i) Validation of the standardized ELISA kit which will be supplied through the Seibersdorf Laboratory.

(ii) Comparison of this test with other currently employed test(s); establishment of negative population values, and if applicable, comparison of vaccinated or treated versus naturally infected animals.

(iii) Use of the ELISA in sero-epidemiological studies on a national/regional basis, due consideration being given for correct sampling protocols.

(iv) Formulation of viable control measures and assessment of their effectiveness using the ELISA.

(v) Use of DNA probes in antigen detection and its use in conjunction with the ELISA for disease diagnosis.

(vi) Use of this information to draw up legislative orders covering animal movement and disease control.

(D) PUBLICATIONS

(i) Isotope-aided Studies on Non-Protein Nitrogen and Agro-industrial By-Products Utilisation by Ruminants

This book has now been published and contains the results of a 5-year Coordinated Research Programme of the same name. It is available from the Division of Publications, IAEA; price Austrian Shillings 400,-- or equivalent paid in convertible currency or UNESCO coupons. In addition to a general description of the achievements of the programme and recommendations for future research, the book contains the following articles:

CONTENTS

Title of Paper	Authors
Aspects of protein nutrition and metabolism in ruminants.	J.V. Nolan, G.L. Krebs, D.W. Hennessy
Gastrointestinal nitrogen turnover in sheep fed non-protein nitrogen and a phosphorus deficient diet.	G. Breves, H. Höller
Enhancing fermentative digestion of cereal straws by using urea-molasses multinutrient blocks.	H.A. El Fouly, R.A. Leng
Supply of N compounds to the rumen and their subsequent metabolism and nutritional value.	R.H. Smith, M.P. Grantley-Smith, R.J. Merry, A.B. McAllan, J.D. Oldham, D.N. Salter
Forage particle breakdown and movement in the reticulo-rumen in cattle and interactions between cold exposure and diets in sheep.	A. Lirette, K. Chai, J.M. Kelly, P.M. Kennedy, L.P. Milligan
Utilization of agro-industrial by-products by swamp buffalo.	Z.A. Jelan, S. Jalaludin, P. Vijchulata
Utilization of maize crop residues by growing dairy heifers and use of rare earth elements as digesta markers in the gut.	L.D. Satter, J.M. Lopez-Guisa, D.K. Combs
Use of sugarcane by-products in ruminant nutrition.	D.M.S.S. Vitti, A.L. Abdalla, J.C. Silva Filho
Utilization of by-products in ruminant diets in Cyprus.	S. Economides, M. Hadjipanayiotou
Non-protein and agro-industrial by-products utilization by ruminants in Bangladesh.	A.M.M. Tareque
Sheep response to fish meal supplements for diets based on industrial by-products or native pastures of the Peruvian High Andes.	V. Talavera
Effect of forage supplementation and alkali treatment of cocoa pod on the utilization of cocoa pod based diets by ruminants.	O.B. Smith
Studies on the utilization of non-protein nitrogen and agricultural by-products as feed for native cattle in the Republic of Korea.	T.K. Oh, C.S. Yoon, J.H. Park, N.H. Lee

(ii) Isotope-Aided Studies on Optimizing Grazing Animal Productivity in the Mediterranean and North African Regions.

This publication will contain the results of the work conducted under a 5-year Coordinated Research Programme of the same name. The data are now being prepared in a standardised format and it is intended to have the publication available for distribution in November 1987.

(iii) Use of Nuclear Techniques in the Study and Control of Parasitic Diseases of Farm Animals.

The results of this Coordinated Research Programme are now being collated and edited and it is hoped to be able to publish these early in 1988.

(iv) Use of Enzyme-linked Immunosorbent Assays (ELISAs) in Animal Disease Diagnosis.

A Training Manual of the above title is in the final stages of writing and we aim to have it published early in 1988.

(E) NEW LITERATURE SEARCH SERVICE

With the escalating cost of scientific journals over recent years there have been concomitant cut-backs in their acquisition by scientific institutions, especially in developing countries. This has resulted in the isolation of the work of many scientists from that of counterparts in other countries with consequent loss of stimulation and reference. In an attempt to overcome these difficulties, the Animal Production and Health Section, in collaboration with the Vienna International Centre's Library, plans to supply scientists associated with the Section through Coordinated Research Programmes and Technical Cooperation Projects with a 'Current Awareness Bulletin in Animal Science'. This bulletin contains a Table of Contents from approximately 30 selected quarterly, monthly and some of the more frequently issued journals on Animal Science which are available in the VIC library. The journal selection procedure was carried out by the professional staff of the Section so as to provide a broad spectrum of journals in animal nutrition, reproduction, animal health and disease diagnosis of direct relevance to developing country scientists. On perusual of the Bulletin and selection of directly relevant and important papers, Contract holders and Technical Cooperation counterparts should in the first instance make a request for a reprint directly from the author. However, in the event of a negative response, a 'Request for Copying Service' form (L-4) should be completed and returned to the VIC library. A reprint of the requested article will then be forwarded to the requestor. At present, no charge is made for this service; however, we would ask our collaborators to be very selective in their perusal of the literature list and not to request an inordinate number of photocopies; also only one copy of each article per institution will be accepted. It is planned to circulate the first Current Awareness Bulletin plus L-4 forms in August 1987 and thereafter at intervals of approximately 2 months. Happy searching!

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

The laboratory dealing with animal disease diagnosis was established in September, 1986. The activities of the laboratory focus on the use of the enzyme linked immunosorbent assay (ELISA) in diagnosis, although other techniques, for example the use of radio-labelled DNA probes for antigen detection, are also being developed.

The laboratory has three broad areas of work:

(i) The assembly and dispatch of kits for disease diagnosis
(ii) The development and evaluation of new diagnostic methods and kits
(iii) The training of scientists in disease diagnosis

The ELISA kits are designed for use in developing countries with due consideration given to the conditions found in many of the laboratories in these countries. To a large extent the same basic kit can be used for all diseases being covered by the Joint FAO/IAEA programme, although clearly each particular disease kit will contain its own antigen and minor alterations in buffer composition etc. Each kit contains a detailed protocol along with information on kit contents and assay trouble shooting. One major aim is to standardise as many aspects of the ELISA as possible. The kit itself, around the size of a "shoebox", has sufficient reagents to carry out 40,000 assays. The only pieces of equipment required are an ELISA reader and suitable pipettes.

Over the next 2 months, the FAO/IAEA ELISA kits will be dispatched to institutes supported by FAO and IAEA and dealing with the following specific diseases - rinderpest, brucellosis, babesiosis and infectious bovine rhinotracheitis. In the next few months kits dealing with antibody detection in trypanosomiasis will be available. As the programme develops it is envisaged that kits for several other diseases will be produced.

This development, assembly and dispatch of kits has been the main thrust of the work in the laboratory over the past few months. However, in the near future it is intended that developmental work will involve also radio-labelled DNA probes for antigen detection(e.g in Aujeszky's disease), monoclonal antibody production (developing cell culture techniques), and antiserum production (rabbit anti-camel conjugates).

The staff of the Section would welcome comments, requests or critisism regarding the use of ELISA kits within the framework of activities supported by the Joint FAO/IAEA Division.

The animal reproduction laboratory continued to produce progesterone RIA kits for FAO/IAEA Technical Cooperation counterparts and Research Contract holders. The method has been further simplified so that pre-coated tubes are now supplied with the kits. About 400 kits are being shipped every 2 months and judging by the feed-back from collaborating institutes, these kits seem to be performing extremely well under the diverse and often adverse conditions existing in Member States. An enzyme immunoassay for progesterone has also recently been established in the laboratory. The method is presently being evaluated and validated for different species of livestock and specific environmental conditions prevailing in developing countries, and in 1988 we intend to conduct a trial involving some 6-8 institutes in which the performance of this new EIA will be compared with the RIA kits.

In the nutrition laboratory the last few months have mostly been spent preparing for and conducting the Training Course which once again

turned out to be a great success. The laboratory also continued with its feed evaluation and formulation testing programme using the rumen simulation technique. The first scientific publication from the nutrition laboratory: "The use of an Artificial Rumen to Assess Low Quality Fibrous Feeds" appeared recently in the journal, Biological Wastes 20: 241-250 (1987).

As far as training is concerned, we had 4 trainees during the last six months. Mr. Hoa Ngueng (Vietnam) and Mr. Jun Hong Park (Republic of Korea) underwent training in RIA techniques while Mr. A. Ngeresa (Tanzania) completed a training course in ELISA techniques. Ms. Zinesh Sileshi (Ethiopia) and Mr. Dusan Jalc (Czechoslovakia) are presently undergoing training in feed evaluation and isotopic techniques in nutrition. More trainees are expected later this year.

(G) FORTHCOMING EVENTS

(1) Second FAO/IAEA Research Coordination Meeting on "Use of Nuclear Techniques to Improve Domestic Buffalo Production Asia - Phase II", Penang, Malaysia, 24-28 August 1987.

(2) FAO/IAEA Regional Training Course for Africa on the "Use of Radio- and Enzyme-Immunoassay Techniques in Studies on Animal Reproduction and Disease Diagnosis", Senegal, April/May 1988.

This Training Course will be held at the Laboratoire National de l'Elevage et de Récherches Vétérinaires (LNERV) Dakar, Sénegal and is open to 20 participants from FAO and IAEA Member States in the African region. The language of the course will be French.

The purpose of the course is to provide theoretical and practical knowledge on the application of RIA and ELISA methodology for measuring reproductive hormones and antibodies/antigens of important viral, bacterial and parasitic diseases of livestock in Africa. The value of these methods within the context of studies on livestock reproductive efficiency and for disease diagnostics will also be covered, as will the more important aspects of reproductive endocrinology and disease surveillance. Particular emphasis will be given to rinderpest and trypanosomiasis but other diseases will also be covered. During the first week of the course, all participants will have lectures on basic nuclear theory as well as on the theoretical aspects of radio- and enzyme immunoassay methods. Demonstrations and practicals will also be given on these topics. During the subsequent 3 weeks, participants being trained on disease diagnosis and animal reproduction will follow separate courses. It is absolutely essential therefore that candidates state on their application forms which part of the course they wish to follow. The lecture and practical sessions will cover the following topics:

- Properties of radiation
- Radiation detection and assay of radioactivity
- Radiation safety
- Principles of Radio- and Enzyme Immunoassays
- Antibody and antigen detecting assays
- Equipment and reagents
- Data reduction
- Quality Control
- Trouble shooting

- Measurement of progesterone and other hormones in blood and milk using solid or liquid phase assays
- Use of hormone measurements in assessing reproductive status of livestock
- Measurement of antibodies against rinderpest by ELISA
- Measurement of antibodies and antigens in trypanosome-infected livestock
- Use of immunoassay methods in serodiagnostics and sero-epidemiological studies

The course is intended for French-speaking African scientists with a veterinary or animal science degree and who are actively engaged in research on livestock reproductive efficiency or disease diagnosis. For those wishing to follow the diagnostic component of the course, preference will be given to candidates working on rinderpest or trypanosomiasis.

As the course will be conducted in French, participants should have no difficulty in following lectures and expressing themselves in that language.

Nominations should be submitted in duplicate on the standard IAEA nomination forms 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, the office of the United Nations Devlopment Programme or the Ministry of Agriculture); they must be received by the International Atomic Energy Agency, P.O.Box 100, A-1400 Vienna, Austria, not later than 31 January 1988. Nominations received after that date or applications sent directly by individuals or by private institutions cannot be considered.

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