



# Animal Production and Health Newsletter

JOINT FAO/IAEA DIVISION OF ISOTOPE AND RADIATION APPLICATIONS  
OF ATOMIC ENERGY FOR FOOD AND AGRICULTURAL DEVELOPMENT  
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## CONTENTS

TO THE READER .....	2
FAO/IAEA RESEARCH COORDINATION MEETING ON BUFFALO PRODUCTION .....	4
STATUS OF EXISTING COORDINATED RESEARCH PROGRAMMES .....	6
NEW REGIONAL COORDINATED RESEARCH PROGRAMMES ON ANIMAL REPRODUCTION AND DISEASE DIAGNOSTICS.....	14
DEVELOPMENTS AT THE SECTION'S LABORATORY UNIT, SEIBERSDORF .....	19
PUBLICATIONS .....	20
FORTHCOMING EVENTS .....	23

Dear Colleague,

In 1987, a Regional Seminar for Latin America, 5 Research Coordination Meetings and a Training Course in animal nutrition were organised by the Section, bringing together over 200 scientists from IAEA and FAO Member States. Judging by the timetable for this year, it is clear that the number of these and other activities will be even greater than before, and so a busy time lies ahead.

As we embark on the 1988 programme, we do so without two of the Coordinated Research Programmes we had been running in previous years, i.e. the programme on animal production in the Mediterranean region and the interregional programme on parasitic diseases. The results of both of these programmes have now been prepared, and in the case of the Mediterranean programme, these have recently been published by the IAEA; a publication from the parasitology programme will be available around April or May. When programmes are completed, the Contracts and Agreements between the IAEA and participating institutes have to be terminated, and in 1987 this involved some 50 scientists and research institutes. However, as you can see from this edition of the Newsletter, new Contracts and Agreements have been drawn up with around 55 institutes and the Section is now operating a total of 160 Contracts and Agreements within the framework of 7 Coordinated Research Programmes. Although two of these programmes are due to be completed this year (in large ruminant reproduction and the Latin American network on animal reproduction), a further two new programmes are announced in this edition of the Newsletter with a view to obtaining proposals for Contracts and Agreements. It would seem therefore that this component of the Section's activities is in good shape.

A further aspect of the 1988 programme is that even more than before, the focus will be on regional programmes. Examples of these include programmes on animal reproduction and on rinderpest and trypanosomiasis diagnosis in Africa which are being conducted in close collaboration with the EEC and ILRAD; programmes on buffalo production, animal reproduction and disease diagnostics in Asia; and a programme on animal reproduction in Latin America which we hope will be extended in the future to cover disease diagnostics. We also intend starting a new programme on disease diagnostics for countries around the Mediterranean. Although there are some drawbacks to conducting purely regional programmes, we feel that these are far outweighed by the many advantages.

Finally, since the last edition of the Newsletter there have been a number of important staff changes, and so we go into 1988 with a somewhat different team than we had in 1987. There have been two separations from the Section - Stefan Oschmann who had been with us for two years took up a position with the National Association for Animal Health in Bonn, and Edward Mather who was on a 1-year sabbatical from Michigan State University, returned to his chair of Large Animal Clinical Sciences at the end of December. Naturally, the departures of Stefan and Ed leave serious gaps in the Section because both have experiences which are difficult to find and both made major contributions to the Section's

activities and development. We can only wish them well for the future. On the other side of the coin however, and as a result of the generosity of the Governments of the Federal Republic of Germany, Italy and the United States of America, we have three newcomers to the Section. Hermann Unger from the Tropical Institute of the Free University of Berlin, FRG, and Francesco Castrignanó from the Department of Cellular and Developmental Biology of the University of Rome, Italy, have joined us to strengthen and expand our efforts in disease diagnostics, and Prof. Bruce Murphy from the Reproductive Biology Research Unit of the University of Saskatchewan, Canada, has taken over responsibility from Ed Mather for our reproduction programmes in Latin America. Also, Dr. Oswin Perera from the Department of Veterinary Clinical Studies, University of Peradeniya, Sri Lanka, will be joining the Section in mid-February to look after our activities in animal reproduction in the Asian region.

We wish you all the best for 1988, and look forward to your continued support of our programmes.

James Dargie, Francesco Castrignanò, Noble Jayasuriya,  
Martyn Jeggo, Bruce Murphy, Camille Ooijen, Kees Plaizier,  
Wyn Richards, Hermann Unger

(A) PAST EVENTS

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

The second RCM of the Coordinated Research Programme on "The Use of Nuclear Techniques to Improve Domestic Buffalo Production in Asia - Phase II" was held at the 'Casuarina Hotel' in Penang, Malaysia, from 24-28 August 1987. Fourteen Research Contract holders from Bangladesh (2), Philippines (2), Pakistan (1), Malaysia (3), Thailand (2), Sri Lanka (1), Indonesia (2) and Vietnam (1), and six Research Agreement holders from Australia (3), Japan (1), Sri Lanka (1) and Malaysia (1) attended the meeting. The meeting was declared open by the Hon. Deputy Minister of Education, Dr. Michael Toyat. The Vice-Chancellor, University Pertanian Malaysia, Prof. Nayan bin Ariff welcomed the participants. At the end of the scientific presentations, work plans were prepared for each contract holder with the guidance and advice of the Agreement holders.

From the presentations made during the meeting, it was quite clear that a lot had been achieved over the past 15-18 months particularly in the area of buffalo reproduction, and that interdisciplinary research should continue in the future but perhaps with greater emphasis on field-oriented research that has a potential for adoption by farmers.

The meeting was extremely well organised and in this respect the Joint Division would like to express its sincere appreciation to the staff of the Faculty of Veterinary Medicine and Animal Science, UPM, particularly to Professors Syed Jalaludin and M.R. Jainudeen and to Dr. Shariffudin Wahab.

Below are some of the recommendations for future research.

Reproduction:

- In the river buffaloes, a major constraint to year-round milk production is the marked seasonality of calvings. In swamp buffaloes, long calving to conception intervals continue to be a major limitation.
- Difficulties in detection of oestrus is an impediment to cross-breeding programmes using AI. The relative importance of the female and male in infertility is not yet clear.
- Studies on the effects of genotype and environment (e.g. season, rainfall, nutrition, management, work, disease) on: (a) age and weight at first calving, (b) interval from calving to conception and (c) intercalving interval should be investigated under small farm conditions.
- The influence of season, stress and nutrition on libido and semen quality should be determined.

### Nutrition:

- To optimize the efficiency of feed use and production from buffaloes, nutritional management strategies should be devised and evaluated in the context of their potential adoption by farm-holders. Where management strategies have been successfully developed, the knowledge must be made available to farm-holders and their adoption encouraged by extension services.
- It is important that nutritional options be evaluated by animal production measurements, i.e. liveweight change, milk production, animal survival/mortality, morbidity, or reproductive and draught power efficiency.
- New feed sources should be identified and evaluated as:
  - (a) basal feed resources;
  - (b) nutrient sources promoting maximum fermentative activity and microbial cell yield from the rumen;
  - (c) sources of by-pass protein and non-protein energy.
- Mixtures of new and existing locally available feeds, with or without non-protein nitrogen (urea) supplementation, should continue to be evaluated as production diets for buffaloes.
- Multi-disciplinary studies and approaches are needed to take account of interactions of nutrition x reproductive efficiency, nutrition x disease, nutrition x environment and nutrition x work.

### Diseases

- In the previous report a recommendation was made to investigate the importance of infectious diseases in buffaloes. More attention should be focussed on this aspect of livestock production.
- In some countries of the region the prevalence and economic impact of several diseases is largely unknown. It is therefore recommended that epidemiological studies should be implemented.
- Improved regional laboratory diagnostic services may be necessary to facilitate epidemiological investigations: specialised training should be given to field and veterinary staff engaged in such studies.
- The economic benefits of disease control should be estimated and where an economic effect is demonstrated, control strategies which can be applied within local farming systems should be developed.

- Information on disease control strategies should be transferred to appropriate extension services.
- The progress of improved animal health programmes which have been implemented should be monitored.

(B) STATUS OF EXISTING COORDINATED RESEARCH PROGRAMMES

(1) Application of Radioimmunoassay Techniques 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 this year. The final RCM is scheduled to be held in Vienna on 2-5 May 1988 during which the results of the 5-year programme will be presented and discussed prior to 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 is expected to be held in 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 will terminate this year. In fact, the final RCM is scheduled to be held in Bogota, Colombia, in September 1988, during which the results of the 5-year programme will be presented and discussed prior to publication.

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

This programme, which currently has 14 Research Contract holders and 6 Agreement holders, has been extended for a further period of 2 years. We intend to hold the final RCM in early 1989.

(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 now been operational for one year and has 24 Research Contract holders and 4 Agreement holders. However, due to several factors it has been decided to form two separate programmes. One of these will consist of the original 7 Contract holders who are involved with Rinderpest diagnosis, plus a further 10-12 African scientists who will be awarded Contracts using funds from FAO and SIDA. This new Programme will be

entitled: "FAO/IAEA/SIDA Regional Network for Sero-Surveillance of Rinderpest". The participants in the new programme are all staff members of the institutes which will be responsible for the sero-monitoring of Rinderpest in Africa under the EEC-funded Pan Africa Rinderpest Campaign (PARC). The programme will be operated in close liaison with FAO in Rome, and with EEC and IBAR officials in Nairobi.

Dr. J. Anderson of the Animal Virus Research Institute, UK and Dr. P. Lefevre of the Institute d'Élevage et de Médecine Vétérinaire des Pays Tropicaux, France, have become Agreement holders within the programme, which will centre around the use of the ELISA to establish annually and on a national basis the antibody status of cattle to Rinderpest. This information will be used to determine the effectiveness of rinderpest vaccination carried out under PARC. Unlike previous Coordinated Research Programmes operated by the Section, this programme brings together Research Contractors funded by the Joint Division and those funded by the FAO Animal Production and Health Division in Rome. It therefore serves as an example of joint programme planning and implementation between two UN organisations and the EEC on a major animal disease problem.

It is expected that the first RCM will be held in Nairobi, Kenya in late September, 1988 and that it will include a training workshop. Full details will be made available to contract holders in due course.

The remaining 17 scientists of the SIDA-funded programme on disease diagnosis have now been joined by a further scientist from Mexico, Dr. Garcia Vazque working on a project entitled "Evaluation of the ELISA test for screening of B. bovis and B. bigemina". The second RCM of this programme will take place in Buenos Aires, Argentina in November, 1988. All participants will be informed in due course of the detailed arrangements.

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

As mentioned in the previous edition of the Newsletter, this programme attracted many proposals for Research Contracts. The Agency has agreed to support 16 Research Contracts and 4 Research Agreements under the programme. The participants in the programme and the titles of their research projects are as follows:

<u>Agreement holders</u>	<u>Title of Research Project</u>
1. Dr. John Nolan Dept. of Microbiology, Bio-chemistry and Nutrition University of New England Armidale, N.S.W. 2315 AUSTRALIA	The nutritive value of grazed forages and crop residues and metabolism of dietary nutrients and fermentation products by ruminants.

- |   |   |
|---|---|
| <p>2. Dr. John D. Oldham<br/>Dept. of Animal Production<br/>Edinburgh School of Agriculture<br/>Kings Building,<br/>West Mains Road,<br/>Edinburgh, EH9 3JG,<br/>UNITED KINGDOM</p> | <p>Food and animal characteristics relevant to production of forage, consumption and nutrient use in productive ruminants.</p>  |
| <p>3. Dr. E.R. Orskov<br/>Rowett Research Institute<br/>Bucksburn,<br/>Aberdeen, AB2 9SB<br/>UNITED KINGDOM</p>   | <p>Methods of estimating intakes and improving utilisation of poor quality straw and forages and their role in animal nutrition during fluctuating nutrient supply.</p> |
| <p>4. Dr. Dennis P. Poppi<br/>Dept. of Animal Science<br/>Lincoln College<br/>University College of Agric.<br/>Canterbury,<br/>NEW ZEALAND</p>                                      | <p>Comparative responses of intake and rumen function in sheep and goats to supplementation of poor quality forages with urea and sulphur.</p>                          |

Contract holders

- |   |  |
|---|--|
| <p>1. Dr. Harry Harrison<br/>Livestock and Pest Research<br/>Centre<br/>National Council for Scientific<br/>Research<br/>P.O.Box 49, Chilanga,<br/>Lusaka,<br/>ZAMBIA</p>                       | <p>Weight, condition, milking response and fermentation type in small holder cattle supplemented with alkali-treated low quality residues.</p> |
| <p>2. Dr. Dorinha M.S.C. Vitti<br/>Animal Science Section<br/>Centro de Energia Nuclear na<br/>Agricultura<br/>Av. Centenario,<br/>Cx. Postal 96-13400<br/>Piracicaba, S. Paulo,<br/>BRAZIL</p> | <p>The availability and the influence of minerals on reproductive parameters in ruminants.</p>   |
| <p>3. Dr. Jorge Combellas<br/>Bovine Section<br/>Facultad de Argonomia, UCV<br/>Inst. de Production Animal<br/>Apartado 4579<br/>Maracay,<br/>VENEZUELA</p>                                     | <p>Protein supplementation of maize silage for growing heifers and milking cows.</p>   |



4. Dr. Clarence A.M. Lakpini  
Small Ruminant Department  
National Animal Production  
Research Institute  
Ahmadu Bello University  
P.M.B. 1096  
Zaria,  
NIGERIA
- Improving the nutritive value of dry roughage through ensiling with leguminous green forage and molasses.
5. Dr. Raisal M. Alam  
Dept. of Animal Nutrition  
Bangladesh Agric. University  
Mymensingh,  
BANGLADESH
- Studies on the nutrient requirement of goats for different production purposes and the development of a feeding system for improving their productivity in Bangladesh.
6. Dr. Nurcan Cetinkaya  
Dept. of Animal Nutrition  
Nuclear Research Institute of  
Animal Health  
Lalahan, Ankara,  
TURKEY
- Investigation of the degradability of feed protein and the efficiency of microbial protein synthesis in the rumen of Angora goats.
7. Dr. Metha Wanapat  
Dept. of Animal Science  
University of Khon Kaen  
Khon Kaen 40002,  
THAILAND
- Optimum level of untreated or urea-treated rice straw fed with concentrate for growing swamp buffalo calves.
8. Dr. Arnaldo A. da Silva  
Dept. of Animal Production  
Universidade de Trás-os-  
montes e Alto Douro (UTAD)  
5000 Vila Real,  
PORTUGAL
- Feeding strategies for ruminants in the Northeast region of Portugal during periods of nutrient scarcity.
9. Dr. Nam Hyung Lee  
Biological Resources Laboratory  
Korea Advanced Institute of  
Science & Technology  
P.O.Box 131, Daejeon  
Seoul,  
KOREA
- Development of feeding strategies for improving ruminant productivity in Korea through the use of nuclear and related techniques.
10. Dr. Yesso Philidor  
Savannah Institute (IDESSA-C.E.)  
Buake 01,  
COTE d'IVOIRE
- Study of meat production with natural Savannah as the staple diet.

11. Dr. A. Jelan Zainal  
 Dept. of Animal Science  
 Universiti Pertanian Malaysia  
 Serdang 43400,  
 Selangor,  
 MALAYSIA  
 Feeding strategies based on agricultural by-products during the season of poor nutrient supply.
12. Dr. M. Hadjipanayiotou  
 Animal Production Section  
 Agric. Research Institute  
 Ministry of Agriculture and  
 Natural Resources  
 Nicosia,  
 CYPRUS  
 Evaluation of supplementary protein sources of varying degradability under fluctuating energy supplies using nuclear and related techniques.
13. Dr. Armando Shimada  
 Centro de Investigacion en  
 Alimentacion y Nutricion  
 Animal  
 Aptdo. Postal 29-A  
 76020 Queretaro, Oro  
 MEXICO  
 Assessment of the productivity of goats on central Mexican highlands.
14. Dr. Nissim Silanikove  
 Dept. of Animal Science  
 Migal-Galilee Technological  
 Centre  
 Industrial area  
 Kirjat Shmona 10200,  
 ISRAEL  
 Evaluation of pasture intake and quality through isotope dilution procedures.
15. Dr. S. Amalia Scheffer de Rojas  
 Dept. de Nutricion Animal  
 Facultad de Ciencias Veterinarias,  
 U.N.A.  
 Castilla Correo 1061  
 Asuncion,  
 PARAGUAY  
 Nutritive value of agro-industrial by-products and crop residues as ruminant feed.
16. Dr. Abdellai Guerquali  
 Dept. of Physiology & Thera-  
 L'Institut Agronomique et  
 Vétérinaire Hassan II  
 B.P. 602  
 Rabat-Instituts,  
 MOROCCO  
 The nutritional needs of D'man sheep during gestation and lactation.

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

The implementation of this Coordinated Research Programme has been made possible through the generous support of the Ministry of Foreign Affairs of the Government of the Netherlands, and has begun with the award of Research Contracts and Research Agreements in the field of animal reproduction. In fact, 14 Contracts and 2 Agreements have been awarded under this component of the programme and we are therefore not seeking any further proposals. The first Research Coordination Meeting covering reproduction will be held at the International Livestock Centre for Africa (ILCA) in Addis Ababa, Ethiopia, from 7-18 March 1988, and it will include training on RIA and EIA methods for hormone measurements plus a short course on standardisation of animal productivity data.

Below is a list of the present participants:

<u>Agreement Holders</u>	<u>Title of Project</u>
1. Dr. L.-E. Edqvist Dept. of Clinical Chemistry, Swedish University of Agricultural Science Uppsala, SWEDEN	Disease reproduction interactions in ruminants.
2. Dr. D.H. Willemse Dept. of Obstetrics, Reproduction, and A.I. Faculty of Veterinary Science 3508 TD Utrecht, NETHERLANDS	Reproduction and reproductive disorders in cattle.
<u>Contract Holders</u>	
1. Dr. A. Bassinga Centre de recherches sur les trypanosomiasés animales CRTA Bobo-Dioulasso, BURKINA FASO	Seasonal variations of cyclicity and progesterone in Baoulé cattle in Burkina Faso.
2. Dr. L.O. Eduvie National Animal Production Research Institute (NAPRI) Zaria, NIGERIA	Studies on the factors affecting the reproductive performance of Bunaji cattle under different pastoral management systems in guinea savanna zone of Nigeria.
3. Dr. J. Epelu-Opio Makerere University Dept. of Veterinary Anatomy Kampala, UGANDA	Application of radioimmunoassay to improve reproductive efficiency in the indigenous breeds of goats in Uganda.

4. Dr. A.G.M. Homeida  
Dept. of Veterinary Medicine  
Faculty of Veterinary Science  
University of Khartoum  
Khartoum North,  
SUDAN  
Resumption of post-partum ovarian activity in indigenous cattle in Sudan.
5. Dr. M.N. Ismail  
Assiut University  
Faculty of Veterinary Medicine  
Assiut,  
EGYPT  
Immunoassay techniques for detection, treatment and control of inactive ovaries, delayed puberty and reducing the calving interval of buffaloes in Upper Egypt.
6. Dr. L.A. Kamwanja  
University of Malawi  
Bunda College of Agriculture  
Lilongwe,  
MALAWI  
Studies of the reproductive performance of the indigenous bovine female in Malawi.
7. Dr. N.L. Kanuya  
Sokoine University  
of Agriculture  
Dept. of Veterinary Medicine  
Morogoro,  
TANZANIA  
A study of the reproductive performance of the Mpwapwa breed in smallholder farms around Morogoro.
8. Dr. T. Kassa  
Addis Ababa University  
Faculty of Veterinary Medicine  
P.O. Box 34  
Debre Zeit,  
ETHIOPIA  
Post-partum reproductive activity of the indigenous cows of Ethiopia.
9. Dr. G. Khaldi  
Institut National de la Recherche  
Agronomique de Tunisie  
Ariana  
Tunis,  
TUNISIA  
Improvement of the productivity of tropical sheep in Tunisia.
10. Dr. A. Lahlou-Kassi  
Institut Agronomique et  
Vétérinaire Hassan II  
Rabat-Instituts,  
MOROCCO  
Improvement of the reproductive efficiency of cattle kept under an extensive management system.
11. Dr. M. Mbaye  
Institut Sénégalais de Recherches  
Animales  
LNERV  
Dakar-Hann,  
SENEGAL  
An analysis of the reproductive characteristics of the domesticated ruminants of Senegal.

12. Dr. L.R. Ndlovu  
 University of Zimbabwe  
 Department of Animal Science  
 Mount Pleasant  
 Harare,  
 ZIMBABWE  
 Improving the productivity of  
 indigenous goats in Zimbabwe.
13. Dr. S.A. Osei  
 University of Science and  
 Technology  
 Dept. of Animal Science  
 Kumasi,  
 GHANA  
 Seasonal effects on the reproductive  
 performance of indigenous breeds of  
 cattle in the forest and Savanna Zones  
 of Ghana.
14. Dr. A. Yenikoye  
 Faculté d'Agronomie  
 Université de Niamey  
 Niamey,  
 NIGER  
 Study of year-round ovarian activity in  
 a herd of peulh sheep kept under  
 traditional management.

The situation with respect to the disease component of the programme is that we have recommended the award of 13 Research Contracts in the field of animal trypanosomiasis using the ELISA as a diagnostic tool. The International Laboratory for Research on Animal Diseases (ILRAD) and the Centre for Tropical Veterinary Medicine (CTVM) have kindly agreed to provide expertise and reagents for these tests and Dr. V. Nantulya of ILRAD and Dr. A.T. Luckins will function as the Agreement holders.

The RCM of this component of the programme will probably be held at ILRAD in May and will include a short training workshop on the handling of the reagents being provided.

(C) NEW COORDINATED RESEARCH PROGRAMMES

(1) Programme I:

As mentioned in the previous edition of the Newsletter, 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. They should arrive in IAEA Headquarters before 30 May since the selection of Contracts to be recommended for funding will be made at that time.

(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 before the end of June 1988.

(a) Title of the programme: Establishment of a Unified Approach to the Diagnosis 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 Aujeszky'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, immunofluorescence, 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 diagnosis 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.

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

The Reproduction Laboratory continued to provide back-stopping services to Research Contract and Technical Cooperation projects in two ways: supply of progesterone RIA kits and fellowship training. During 1987, the Unit supplied over 65 projects in 40 Member States with 1/4 million assay tubes; over half the progesterone kits were sent to the Latin American region, approximately a quarter to Asia, one fifth to Africa and the remainder to Europe and the Mediterranean region. The ratio of plasma : milk kits supplied was ca 2:1. The firm orders for progesterone kits in 1988 is already nearing that supplied in 1987; it is anticipated that the total demand will be close to 400,000 assay tubes as new regional programmes in Africa and Asia get underway.

We are sensitive to your remarks about the kit delivery service and are continually upgrading both kit quality, frequency of delivery and delivery routes to satisfy your needs. In this regard, we note that some of you have had difficulties with reconstituting our freeze dried standards and quality control samples. We have therefore decided to supply kit standards and QC in liquid form for an experimental period to see whether these are preferable; please let us have your views about the new standards. Some difficulties are also being encountered in kit delivery due to delays at customs as a result of local regulations or bureaucratic problems. These difficulties can be overcome locally with some lateral thinking; for instance, we have found in Latin America that routing kits directly to the end-user is more rapid, safer and cheaper than sending them through the UNDP or local Atomic Energy Authority. The most efficient routing depends entirely on local conditions and it is for you to advise us on the most appropriate delivery route.

Now that more professional staff have been identified for the RIA laboratory, we plan to implement an External Quality Control Service during 1988. Further details of this will be given in the next edition of the Newsletter.

An enzyme immunoassay technique for progesterone determination is still under development, and it is envisaged that EIA milk progesterone kits will be sent to selected laboratories in mid-1988 for validation.

The Nutrition Laboratory continued with its feed evaluation and formulation testing programme using the Rumen Simulation Technique. Our efforts over the past six months concentrated on testing some dietary formulations based on acid-treated (1% sulphuric acid) beech saw dust from Czechoslovakia, as a suitable substitute for grass hay. We still have some feed samples awaiting evaluation and we hope to complete these early next year.

A number of our scientists engaged in feed characterisation have requested standardised samples of fibrous residues for Van Soest fibre analysis. We are now in the process of preparing these standards and by the end of February we should be able to supply any interested parties with two sets of standards for Van Soest fibre determinations.

In the Disease Diagnostic Laboratory, the last six months has seen the final development of various ELISA disease diagnostic kits and their assembly and despatch to various Contract holders. Some 14 Rinderpest, 6 Brucella, 4 IBR, 2 Babesia and 4 general antibovine ELISA kits have been despatched to Africa, Latin America and Asia. We now await feedback on their effectiveness in the field and an evaluation of the degree of uniformity that can be achieved using standard kits. This aspect of the laboratory's work will clearly continue with more kits being sent and modifications being made as feedback following their use is received. Already it is apparent that kits containing reagents sufficient for testing 20,000 sera should be modified to suit better the smaller requirements of some of our Research Contract holders and counterparts of Technical Cooperation projects.

Development of this laboratory has continued with the establishment of equipment and methodologies for carrying out tissue culture, monoclonal antibody and DNA probe work. In the next six months it is hoped to forge ahead with these techniques so that reagents and further diagnostic kits will become available through laboratory for assisting scientists in developing countries. A computer has been installed alongside the ELISA reader to help develop and evaluate suitable software programmes specifically designed for use in those developing countries where such computerisation is appropriate.

The programme for the near future will involve also radio-labelled DNA probes for antigen detection (e.g. in Aujeszky's disease, infectious rhinotracheitis), monoclonal antibody production (developing cell culture techniques) and antiserum production (rabbit anti-camel conjugates).

As far as training is concerned, three JAEA fellowships holders completed their training during the last six months, two in nutrition (Ms. Z. Sileshi from Ethiopia and Mr. D. Jolc from Czechoslovakia) and one in RIA techniques (Ms. T. Apichartsrungkoon from Thailand). More trainees are expected in 1988.

(D) PUBLICATIONS

(i) Isotope-aided Studies on Livestock Productivity in Mediterranean and North African Countries

This book was published in January 1988 and contains the results of a 5-year Coordinated Research Programme of the same name which was funded by the Italian Government. The publication is available from the Division of Publications, IAEA; price Austrian Shillings 780,- 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

<u>Title of Paper</u>	<u>Authors</u>
Animal production in the Mediterranean region: Present situation, problems and future trends.	P. Auriol (FAO)
Mediterranean breeds of cattle, sheep and goats.	I.L. Mason (FAO)
The use of tritiated water in evaluating animal production parameters.	D. Robertshaw (USA)
Effect of heat stress and genotype on water turnover in pregnant and lactating sheep.	S. Benlamlih (Morocco)
Productivity of Bedouin goats: Coping with shortages of water and adequate food.	I. Choshniak, A. Brosh, A. Shkolnik (Israel)
Water requirements and metabolism of Egyptian sheep and goats as affected by breed, season and physiological status.	G.A. Hassan, F.D. El-Nouty, M.H. Salem, M.G. Latif, A.M. Badawy (Egypt)
Development of a new heat tolerance index for selecting productive goats for the tropics.	T.H. Kamal, S.I. Mostafa, A.A. Habib, A.M. Elmasry A.M. Abdelsamee, A.I. Abolnaga, F.A. Kassab, A.M. Abdelhamid (Egypt)
Genotype-environment interactions in improving animal production in harsh environments.	J.E. Vercoe, J.E. Frisch (Australia)
New technologies and animal improvement.	R.B. Land (UK)
Production of progesterone antibodies and their use in studying reproductive functions in sheep and goats.	E. Seren, M.L. Bacci (Italy)
Controlled breeding and artificial insemination of Angora goats in Turkey.	S. Ozsar, B. Güven, A. Ekici, S. Arif (Turkey)
Oestrus behaviour and ovarian activity in D'Man and Sardi breeds of Moroccan sheep under normal and experimental photo-periods.	A. Lahlou-Kassi, R. Boukhliq (Morocco)
Reproductive pattern of local sheep in Egypt with special reference to the effects of breed, season and management.	A.M. Rakha, S.A. Essawy, A.I. El Azab (Egypt)
Control of the reproductive performance of Chios sheep and Damascus goats: Studies using hormone radioimmunoassays.	A.P. Mavrogenis (Cyprus)

- Seasonal variation in sexual activity and endocrine changes associated with follicular maturation and development in the Peulh ewe. A. Yenikoye (Niger)
- Hormone profiles and haematological characteristics during oestrous cycle, pregnancy and lactation in Egyptian breeds of sheep. M.H. Salem, A.M. Badawy, F.D. El-Nouty, G.A. Hassan, M.G. Latif (Egypt)
- Age and body weight of Moroccan local cattle at puberty: Effect of season. A. Mazouz, A. Asri (Morocco)
- Use of progesterone levels in peripheral blood for studying reproductive patterns of Egyptian buffaloes. H.E. El-Sobhy, F.A. Khalil, A.E. Abdelaal, M.A. El-Fouly (Egypt)
- Patterns of ovarian and oestrous activity and induction of cyclic activity during the post-partum period in Egyptian buffaloes. M.B. Aboul-Ela, R.M. Khattab, F.E. El-Keraby, M.M. Shafie, L.H. Bedeir (Egypt)
- Investigation of hormone profiles in dairy cattle with a view of controlling fertility and increasing reproductive efficiency. R. Kovacevic, L. Krsmanovic, D. Maric, R. Perkucin, S. Veselinovic (Yugoslavia)
- Influence of nutrition on ovulation rate and testicular growth of Merino sheep. J.B. Rowe (Australia)
- Assessment of nutritional value of forages for animal production in the tropics. J.P. Hogan (Australia)
- An approach to defining the energy requirements of dairy sheep. P. Susmel, R. Cuzzit (Italy)
- Feed evaluation, nitrogen requirements and the effect of supplementary feeding on the performance of small ruminants in Cyprus. M. Hadjipanayiotou (Cyprus)
- Improving the nutritional status of sheep and goats grazing the northern zone of the western desert of Egypt. M.A. Naga (Egypt)
- Evaluation of some feedstuffs with special emphasis on the effect of nitrate and other non-protein nitrogen fractions on ruminal microbial metabolism. J.A. Nikolic (Yugoslavia)

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

The results of this Coordinated Research Programme have now been edited and the Proceedings will be published around the middle of 1988.

- (iii) 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 in 1988.

(F) FORTHCOMING EVENTS

- (i) FAO/IAEA First Research Coordination Meeting on "Immunoassay Techniques to Improve Reproductive Efficiency and Health Status of Indigenous African Livestock", ILCA, Ethiopia, 7-18 March 1988 (for activities in animal reproduction).
- (ii) FAO/IAEA First Research Coordination Meeting on "Immunoassay Techniques to Improve Reproductive Efficiency and Health Status of Indigenous African Livestock", ILRAD, Kenya, May 1988 (for activities in disease diagnosis).
- (iii) FAO/IAEA Consultants Meeting on Disease Diagnosis, Vienna, 14-16 March 1988.

A consultants meeting on epidemiological approaches to serum sampling with particular reference to the Pan Africa Rinderpest Campaign will be held at the IAEA's headquarters in Vienna. Epidemiologists from both Europe and Africa will be drawing up guidelines with the eventual aim of producing a booklet on basic principles and approaches to be adopted in carrying out serological surveys in developing countries. It is envisaged that this document will be issued to all Research Contract holders in the field of animal disease diagnosis.

- (iv) FAO/IAEA Final Research Coordination Meeting on "Application of Radioimmunoassay to Improving the Reproductive Efficiency and Productivity of Large Ruminants", Vienna, 2-5 May 1988.
- (v) FAO/IAEA Regional Training Course for Latin America on "Immunoassay and DNA probe Techniques in Animal Disease Diagnosis", Argentina, November 1988.

This course will be held at the Instituto Nacional de Tecnologia Agropecuaria, Buenos Aires. The purpose of the course is to provide theoretical and practical knowledge on the application of ELISA and DNA probe methodology for measuring both antibody and antigen in disease diagnosis. Particular emphasis will be placed on Foot-and-Mouth Disease and Babesiosis although other disease will be covered. The course will consist

of both lectures and practicals closely linked together to provide not only a theoretical background to the techniques employed but also a working knowledge and hands-on experience of these procedures. The course will last for one month; the working language will be English.

The lecture and practical sessions will cover the following topics:-

- Principles of enzyme immunoassays
- Principles of radio- and enzyme-labelled DNA probes
- Handling of radioisotopes
- Radiation detection and assay of radioactivity
- Antibody and antigen detection systems
- Measurement of antibodies and antigens relating to Foot-and-Mouth Disease diagnosis
- Measurement of antibodies and antigens relating to Babesiosis
- Use of immunoassay methods in serodiagnostics and sero-epidemiological studies
- Equipment and reagents
- Principles of epidemiology
- Data collection, storage and processing

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through established official channels (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the local office of the United Nations Development Programme or the Ministry of Agriculture); they must be received by the International Atomic Energy Agency, PO Box 100, A-1400 Vienna, Austria not later than 30 June 1988.

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