



Animal Production and Health Newsletter

JOINT FAO/IAEA DIVISION OF ISOTOPE AND RADIATION APPLICATIONS
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Dear Colleague,

Quite apart from the normal day-to-day operation of our Technical Cooperation and Research Contract Programmes, the Section has been heavily involved over the past 6 months in the organisation and running of an International Symposium, 3 Research Coordination Meetings and a Consultants' Meeting. We have also been trying to obtain funds for initiating new Coordinated Research Programmes and the results of these efforts will shortly lead to the establishment of two additional programmes covering work on disease diagnostics and reproduction. Added to this, we are now preparing for a further Research Coordination Meeting and two Training Courses, and the work in the Laboratory Unit at Seibersdorf has now reached the stage where we are ready to embark on providing technical back-up to our programmes on disease diagnostics as well as the already established support in nutrition and reproduction.

Further details of all these events and activities are given in the pages that follow, but it is perhaps worth making a number of general points here. Most important, and indeed gratifying to us, is the support which the Section is now receiving from outside funding organisations. Such support takes a number of different forms - ranging from providing the services of consultants or the funds to enable scientists from developing countries to participate in FAO/IAEA sponsored meetings, through to funding whole Coordinated Research Programmes including the laboratory support for such programmes. It hardly needs to be stressed that this support has not only allowed us to go further in meeting the increased wishes from scientists in developing countries to participate in our programmes which have traditionally been nutrition and reproduction oriented, but has enabled us to expand into disease diagnostics.

In this regard, we would particularly draw your attention to the fact that the Co-ordinated Research Programme on Animal Production in the Mediterranean and North African Region which has been in operation for the past 3 years is in fact funded by the Italian Department of Cooperation for Development. Likewise, the Swedish International Development Authority (SIDA) has agreed to support the new Coordinated Research Programme on Animal Disease Diagnostics which was announced in previous editions of the Newsletter; and only last week, we were informed that the Ministry of Cooperation and Development in the Netherlands would support the establishment of a new Regional Coordinated Research Programme for Africa which will involve studies on reproduction and disease diagnosis using immunoassay methods. Naturally, we are very grateful to all these organisations for their assistance.

On the staff side, the news is a mixture of good and bad. First, the bad news is that Lars Edqvist will be leaving the Section late in September to return to his position of Professor in Clinical Chemistry at the Swedish University of Agricultural Sciences, Uppsala, and Ray Nachreiner will likewise be returning to his position of Professor of Physiology at Michigan State University at around the same time. Without question, the departures of Lars and Ray are a great loss to the Section, and they will certainly be missed - not only for their outstanding technical expertise, but for the enthusiasm and sense of teamwork which they have shown throughout their assignments in Vienna and elsewhere. Their contributions also played a very large part in putting the Section's activities in animal reproduction (including the laboratory support programme) where they are now. On the positive side, the initiation of activities in disease diagnostics, and the strengthening of our efforts to assist animal production and health activities in Africa have meant that funds are now available for the appointment of 3 additional staff members. Two of these will be involved in disease diagnostics, and the third in animal reproduction. In this regard, we are pleased to announce that Dr. Martyn Jeggo will join us in September from the Animal Virus Research Institute,

Pirbright, U.K. to lead the diagnostic activities. Martyn has considerable experience of working in Africa and the Middle East and this, together with his close association with Pirbright will undoubtedly help in strengthening and broadening the Section's programme. The other appointments will be announced in the next Newsletter.

With best wishes,

James D. Dargie
Lars-Eric Edqvist
Noble Jayasuriya
Ray Nachreiner
Stefan Oschmann
Wyn Richards

(A) PAST EVENTS

- (1) First Research Coordination Meeting on "Use of Nuclear Techniques to Improve Domestic Buffalo Production in Asia - Phase II", Bogor, Indonesia, 27-31 January 1986

The meeting was hosted by the Centre for Application of Isotopes and Radiation (BATAN) and the Centre for Research in Animal Science (CRIAS). The participants were welcomed by Dr. Gunawan Sutardi, Director General of AARD while the meeting was ceremonially opened by Dr. Jali Ahimsa, Director General of BATAN. Dr. B.K. Soni, FAO Regional Officer for Animal Production and Health for Asia and the Pacific delivered the keynote address. Dr. P. Auriol, Chief, Animal Production Service, represented the Animal Production and Health Division, FAO, Rome.

Twelve Research Contract holders and six Research Agreement holders from Bangladesh (1), Pakistan (1), Malaysia (3), Sri Lanka (2), Indonesia (2), Thailand (2), Japan (1), Vietnam (1), Australia (3) and the Philippines (2) attended the meeting. After the scientific presentations, which included the achievements of the individual contract and agreement holders over the past 12-18 months, the meeting focussed on preparing work plans and research strategies for the next 15-18 months. The meeting concluded stressing the need for a multidisciplinary approach to research at field level for the better understanding of the production parameters of the Asian water buffalo.

Some highlights from recommendations for future research.

Nutrition:

- (i) The resources available for buffalo production should be defined as basal energy sources, rumen activators or by-pass nutrient sources. They should be used to the maximum efficiency for growth, lactation, reproduction and draught power.
- (ii) Methods need to be developed for assessing (a) the efficiency of rumen fermentation in animals on diets of locally available resources; (b) requirements for by-pass nutrients and (c) supplements as a source of by-pass nutrients.
- (iii) Attempts should be made to manipulate the rumen and the diet to maximise the digestibility of a feed and assess the effects of these

manipulations on productive functions such as growth, lactation, reproduction and draught power.

(iv) There is an urgent need to assess the effects of physiological state, diet, environment and work on rumen function and on requirements.

Reproduction:

(i) Studies on puberty: The main objectives should be to determine the body weight and age at puberty under different conditions of environment, management and nutrition. These studies should include monthly measurements of body weight from the time of weaning, and in the female, rectal palpation of genitalia and measurement of progesterone at weekly intervals, commencing at 18 months of age or 225-250 kg body weight, whichever occurs first. All animals should be under a standard regime of control and monitoring for diseases.

(ii) Studies on post-partum reproduction: The objectives should be to determine the interval from calving to onset of cyclic ovarian activity, in relation to genotype, environment, management and nutrition. These studies should include body weight changes, rectal palpation and measurement of progesterone on a regular sequential basis.

Under smallholder conditions, these may be done between 90-120 days post-partum, whereas they should be done between 30-120 days under experimental conditions. The major criteria as evidence of cyclic activity should be either the presence of a palpable corpus luteum or luteal levels of progesterone, or a combination of these two.

(iii) Studies should also be conducted, where relevant, on diseases influencing fertility in adults, and on those causing morbidity and mortality in calves.

Health:

(i) Further studies are required to determine the significance of Toxocara vitulorum in different countries and under different management practices. With on-going research providing improved knowledge of the life cycle, practical methods of control should be developed and applied.

(ii) Haemorrhagic septicaemia is a disease of major importance and requires further study. Although vaccination is practised widely, outbreaks of the disease still occur. This could be due to poor vaccine quality, improper use of vaccine or inadequate vaccine coverage.

(iii) The importance of other infectious diseases on buffalo production is still poorly understood. It is important not to restrict future research to individual diseases, but to make attempts to assess the involvement of any disease in productive losses, by obtaining data from clinical observations in the field and from material submitted to diagnostic laboratories.

(2) FAO/IAEA International Symposium on the "Use of Nuclear Techniques in Studies of Animal Production and Health in Different Environments, V.I.C., Vienna, 17-21 March 1986

It seems from all reports both during and following this Symposium that the event was highly successful, not only from the scientific standpoint but also because of the considerable interaction which took place between people from so many different scientific and cultural backgrounds. In fact, there were about 130 participants from 45 countries, and 81 presentations of

which 43 were posters. Many of the participants were from developing countries and the great majority of the presentations described work conducted within developing countries, often with assistance from the Joint FAO/IAEA Division. Again, however, we received generous support from many national universities and research institutes worldwide. We were also assisted by the British Council; the Italian Department of Cooperation for Development; the International Foundation of Science (IFS); the Overseas Development Administration of the United Kingdom (ODA); the Swedish Agency for Research Cooperation with Developing Countries (SAREC); the Swedish International Development Authority (SIDA) and the United States Agency for International Development (USAID). It is with pleasure that FAO and IAEA acknowledge this support which enabled so many people to attend. We would also like to thank the participants for making this Symposium so worthwhile and enjoyable, and trust that they benefitted as much from it as we and our sister Division in FAO enjoyed organising it.

Now, we are in the process of preparing the proceedings for publication and thanks to the work of the Editor, Mrs. Pamela Howard-Kitto, we should achieve our target publication date of September.

- (3) Second FAO/IAEA Research Coordination Meeting on "Application of Radioimmunoassay to Improving the Reproductive Efficiency and Productivity of Large Ruminants", V.I.C., Vienna, 24-26 March 1986.

This meeting was held in conjunction with the Symposium. The programme is well established and is working satisfactorily. All the contract holders have been successful in applying the radioimmunoassay technique for progesterone measurement and all the laboratories are now operational. Furthermore, most contract holders have succeeded in identifying the nature of the problem studied and can now embark on developing problem-solving strategies in experiments. The work plans for each Contract holder were agreed upon at the coordination meeting.

- (4) Final FAO/IAEA Research Coordination Meeting on "Isotope-aided Studies on Non-protein Nitrogen and Agro-industrial By-products Utilization by Ruminants with Particular Reference to Developing Countries", V.I.C., Vienna, 24-26 March 1986.

The final RCM of this programme was also held in conjunction with the FAO/IAEA International Symposium. After the individual presentations, the group formulated conclusions and drew up recommendations for future research in the area of ruminant nutrition. The full text of the papers and the conclusions and recommendations arising from this meeting will be published as a Panel Proceedings Series in 1987. We would like to thank all the Contractors and Agreement holders who participated in this programme over the past 5 years and also Drs. K. Cheng (Canada), J.W. Czerkawski (U.K.), L. McDowell (USA), R. Orskov (U.K.), D. Poppi (New Zealand) and J.E. Vercoe (Australia) for their assistance.

- (5) FAO/IAEA Consultants Meeting on Animal Disease Diagnostics, V.I.C., Vienna, 24-25 March 1986

This meeting was convened for the purposes of laying down the criteria which should be adopted when recommending support for Research Contract proposals, and for advising on the respective roles of the FAO/IAEA laboratory at Seibersdorf and other research institutes in providing technical support to

Technical Cooperation projects and Research Contract programmes in the field of animal disease diagnostics. The main conclusions of the Consultants were as follows:

(i) Scope

There was general agreement that every attempt should be made to place special emphasis on the following:

Rinderpest
Foot-and-Mouth Disease
Brucellosis and other genital diseases
Diarrhoeal Diseases
Tick-borne Diseases
Trypanosomiasis

There was also general agreement that while every attempt should be made to ensure that a "critical mass" of scientists or institutes (i.e. 5-6) should be involved in work on any particular disease, the primary considerations should be the quality of the proposal submitted for funding and the capability of the institute/scientists to conduct the work envisaged. Consequently, and subject to availability of funds, good proposals for work on other diseases (including diseases of monogastric animals), should not be excluded from consideration.

It was felt that, where appropriate, strong efforts should be made to produce standardised kits or reagents, and that these should have already been tested in laboratories with substantial experience in using these kits/reagents. Thus, the emphasis should be on transferring these materials and associated technologies, rather than on requiring Contractors in developing countries to develop the specific reagents individually.

Initially, emphasis should be on tests which rely on "by-eye" reading, moving thereafter on to those requiring battery-operated manual readers or in some cases, fully automated systems.

For some diseases (but not all), there will be a need to compare new ELISA tests with established tests.

(ii) Support from FAO/IAEA Laboratory at Seibersdorf and other Laboratories

Successful initiation and development of the programme will require substantial technical back-stopping from the FAO/IAEA laboratory as well as from a number of laboratories in developed countries. This support will be required specifically for distribution of reagents (e.g. positive and negative sera, antigens, anti-species antisera); standardisation of ELISA's and adaptation and development of new methods; and quality control of tests.

The precise role of the FAO/IAEA Laboratory will depend very much on the willingness of the Austrian Veterinary Authorities to grant importation licences for antigens and sera, and until this has been discussed fully, no conclusion can be made. However, the indications are that these materials may enter Austria, if sent from reputable laboratories and accompanied by proper certification of treatment (e.g. heat, radiation, etc.).

In the course of the discussions, it emerged that CSIRO, Indooroopilly, Australia, could provide standardised reagents for babesiosis and anaplasmosis; that the Animal Virus Research Institute, Pirbright, U.K., could provide reagents for rinderpest, foot-and-mouth, pleuropneumonia and other viral infections if required; and that Cornell University, USA, could assist with brucellosis.

Where required, Technical Contracts should be provided to secure these inputs to the programme, and other funds should be made available to enable inter-change of scientific staff in the FAO/IAEA laboratory and other collaborating institutes.

(iii) Training

Every effort should be made to ensure that training becomes an integral part of the programme, and that e.g. as many potential African Contractors as possible are able to attend the FAO/IAEA Regional Training Course on Disease Diagnostics for the African Region in November 1986. In addition, all Contractors should attend the FAO/IAEA/SIDA workshop on the subject, which is tentatively earmarked for 11-15 May 1987 in Uppsala, Sweden. Efforts should also be made to prepare a training manual and video film on immunoassay techniques in disease diagnostics. In fact, the manual is now in draft form and should be ready for publication by the end of 1986.

(iv) The Role of Agreement Holders

To encourage the closest possible contact between Contract and Agreement holders; Agreement holders should have the opportunity of visiting Contractors and vice versa at regular intervals. Funds for this purpose should be made available both from the SIDA budget and from IAEA's Fellowship Training and Technical Cooperation programmes (e.g. Agreement holders should, where possible, act as FAO/IAEA experts). Agreement holders should provide reprints of relevant scientific papers to those Contractors with whom they will become associated.

We would finally like to thank the following for their valuable suggestions in relation to this programme: Dr. B. Hurvell (Sweden), Dr. R.H. Jacobson (USA), Dr. M. Jeggo (United Kingdom), Dr. J.W. Moreno-Lopez (Sweden), Dr. E. Munz (Federal Republic of Germany), Dr. W. Pfahler (Federal Republic of Germany), Dr. D. Rothauer (Italy), Dr. W. Schuller (Austria) and Dr. I.G. Wright (Australia).

(B) STATUS OF COORDINATED RESEARCH PROGRAMMES

(1) Isotope-aided Studies on Non-Protein Nitrogen and Agro-Industrial By-Products Utilization in Ruminant Nutrition with Particular Reference to Developing Countries.

As mentioned earlier, this programme was terminated in March 1986 and the results are now being prepared for publication.

(2) Use of Nuclear Techniques in the Study and Control of Parasitic Diseases.

We plan to hold the final RCM of this programme in Vienna during the first half of 1987 and subsequently to publish the results.

(3) Application of Radioimmunoassay to Improving the Reproductive Efficiency and Productivity of Large Ruminants.

This programme has 13 Contractors and 4 Agreement holders and therefore no further awards can be considered. The final RCM will probably be held in 1988.

(4) 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 2nd RCM is being planned for the early part of 1987, and the exact timing and location will be announced in the next Newsletter.

(5) Optimizing Grazing Animal Productivity in the Mediterranean and North African Regions with the Aid of Nuclear Techniques.

This programme also has a full complement of Contract and Agreement holders; we intend to hold the final RCM in 1987 and to publish the results thereafter. Again, the timing and location of this meeting will be given in the next Newsletter.

(6) 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 5 Agreement holders, and therefore we are not seeking further proposals. We are making plans to hold the 2nd RCM in Costa Rica from 3-7 November 1986.

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

In this programme 15 Contracts and 6 Agreements have been awarded and we are not seeking any further proposals. The 2nd RCM will be held either late in 1987 or early in 1988, depending upon the availability of funds.

(8) Application of Immunoassay Techniques for Improved Diagnosis and Control of Diseases of Livestock.

We have received over 60 applications for this programme and thanks to the generous support of SIDA, we are now in a position to award Contracts to some 20 institutes in developing countries and Research Agreements to 5 institutes in developed countries. We are not seeking any further proposals for this programme. The First RCM will be held in May 1987 in Uppsala, Sweden, and this will be followed by a training workshop.

(C) NEW COORDINATED RESEARCH PROGRAMMES

Thanks to support recently provided by the Ministry of Cooperation and Development of the Netherlands, we are now in a position to bring to the attention of scientists in Africa, a new Coordinated Research Programme which will focus on animal reproduction and disease diagnostics. Since we intend to have this programme fully operational by early 1987, proposals for Contracts should be sent to Mr. P.M. Cate, Head of the Contracts Administration Section of IAEA before 1 November 1986.

1. Title of Programme: Immunoassay Techniques to Improve Reproductive Efficiency and Health Status of Indigenous African Livestock.

2. Scientific Background:

Africa is endowed with considerable animal wealth (amounting to 14% of the world's cattle, 16% of sheep, 33% of goats and more than 50% of camels),

and also has favourable livestock:population:land ratios. Nevertheless, the contribution of livestock is not commensurate with the number of animals or the extent of land resources used, and although cattle numbers for example have increased by 10% over the past decade, animal productivity (i.e. milk and meat production/animal) has remained virtually static. This, coupled with an annual population increase of 3% per annum, has resulted both in a sharp decline in animal protein production per head of population, and in striking increases in the importation of livestock and animal by-products (meat imports in 1970 were 26,000 tonnes; by 1980 the figure was 123,000 tonnes). To reverse these trends will certainly not be easy, but from the above figures it is clear that apart from human population control the central problem to be tackled is the poor quality of livestock in Africa - productivity is far below international standards. If animal productivity could be improved, the benefits to Africa, both economic and in terms of human health would be enormous.

There are (amongst others), three principal and inter-related ways to improve livestock productivity in Africa. Firstly, to improve their reproductive efficiency; secondly to improve their nutrition; and thirdly to improve the diagnosis and control of those viral, bacterial and parasitic diseases which are endemic to the Region and which apart from causing death, result in impaired growth and reproductive performance. However, it must be said that the basic problem in much of Africa is that insufficient basic information exists on how well indigenous breeds of livestock perform within the environments in which they exist and therefore an important prerequisite to improving the African livestock situation (e.g. through cross-breeding programmes) must be the initiation of simple integrated studies on the reproductive efficiency, nutritional and disease status of different genotypes kept in different environments.

Studies on livestock reproductive efficiency are greatly facilitated by utilising radioimmunoassay and related techniques because by enabling measurement of minute levels of the hormones which control reproductive processes, these 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) and 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 both exotic and indigenous breeds of livestock in Africa since changes in hormone levels (particularly progesterone) could be employed to identify the impact on ovarian activity of various nutritional and disease constraints and thereby assist substantially in generating the basic information required to introduce more efficient breeding and/or disease control practices and to identify breeds with superior reproductive behaviour under given environmental conditions.

Paramount to the control of livestock diseases is rapid and accurate diagnosis. In many instances diagnosis is based solely upon clinical observations, but often the clinical signs of some diseases vary greatly and cannot be differentiated from others. Such observations should therefore be supported by isolation and identification of the organisms concerned (often a tedious procedure), and by serological immunoassay tests. These tests either involve detection of organism-specific antigens or an altered antibody status, and until recently have utilised classical neutralisation, complement fixation or gel precipitation. However, radioimmunoassay (RIA) and related procedures, in particular enzyme immunoassays (ELISA) offer tests of high sensitivity, precision and through-put, and low cost. They are also of such simplicity that they may readily be carried out in the average radioisotope or clinical

laboratory, and because no radioactive or other material is administered, they do not require the direct participation of the animal.

Furthermore, a central laboratory can handle samples sent in from a wide area. Their application in the African Region would be in two principal areas (a) the detection and identification of vector-borne diseases of ruminant animals (e.g. presence of babesia and trypanosome organisms) and (b) the quantitation and characterisation of antibody responses (e.g. in vaccination, chemotherapeutic and/or prophylactic campaigns).

By providing information on the prevalence and incidence of specific infections and on the variables which influence the frequency and efficacy of preventative procedures against such infections, these tests will assist both in the development and in the improvement of measures for the prevention and control of some of the major livestock diseases in Africa.

3. Scientific Scope and Proposed Programme Goals:

The programme will be of a multidisciplinary nature, directed towards obtaining the basic technical information which can subsequently be used to institute low-cost management changes which will increase the productivity of livestock in the African Region. Particular emphasis will be placed on the application of immunoassay techniques (RIA and ELISA), to monitor reproductive efficiency of indigenous breeds of livestock and the role of vector-borne diseases as constraints on such efficiency at the small farm level.

The following topics will have priority for study:

- (1) Documentation of the reproductive performance of indigenous breeds of livestock on the small farm level.
- (2) Examination of management practices aimed at reducing the age to puberty and the interval between parturition and onset of sexual function.
- (3) Conducting comparative studies on the usefulness of modern immunoassay methods and longer established methods for diagnosing vector-borne diseases of livestock.
- (4) Application of clinical and laboratory diagnostic methods to determine the role of disease on reproductive efficiency of livestock.

Subject to the availability of funds, the IAEA and FAO have also agreed to establish a new Coordinated Research Programme on Animal Nutrition. This programme is open to participation by developing country scientists from any Member States of FAO and IAEA, and again proposals for Contracts should be sent to Mr. Cate by 1 November 1986.

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

(i) Scientific Background:

The variety of ruminant production systems can be broadly categorised under three major groupings: traditional grazing, ranch and crop/livestock. Traditional grazing systems are a major source of livestock feed for sheep, goats and cattle, and are of particular importance in Africa and parts of the Middle and Far East. Ranch systems as well as traditional grazing systems for sheep and cattle production are more common in Latin America and parts of

Asia. Crop/livestock systems, of varying degrees of integration, are common to much of the African continent when cattle are the prime species of concern and in South East Asia where buffaloes are the species of major importance, particularly in small holder systems.

The components of productivity common to all systems, are reproduction, survival, growth, milk and wool production, and draught power output. However, the relative importance of each of these components varies depending on the purpose for which animals are used and the desires and aspirations of the livestock owner. These in turn are determined by complex socio-economic factors. Nevertheless, in looking for technological advances in feeding strategies, it is important to define the systems and the components of productivity that are important to it.

The nature and magnitude of the response to nutritional improvement will depend on the genotype (species/breed/strain) and on environmental factors such as high temperatures and humidity, and the occurrence of parasitic and other diseases. However, nutrition can be manipulated in the following ways in order to achieve improvements in one or all components of productivity.

- (a) Increasing feed intake and digestibility; supplying dietary nutrients post ruminally.
- (b) Modifying the way in which absorbed nutrients are partitioned into body tissues (fat and protein), milk and draught power output.
- (c) Sparing wastage or enhancing deposition of body tissues with specific supplements.

Inherent in this approach is the need to identify both conventional and non-conventional feed resources that may contribute to overcoming nutritional constraints to a target level of production; the need to establish the relative importance of conserving fodder as fodder per se or as tissue stores that can be mobilised in times of feed shortage or at times of high nutrient demand; and the need to assess the relative importance (biological and economic) of enhancing the level of nutrition in the wet season as opposed to ameliorating dry season losses of which drought feeding for survival is a special case.

In identifying these approaches, consideration should be given to component(s) of productivity to which the work is relevant and to the design of experiments that not only develop principles but demonstrate the effectiveness of particular procedures in improving productivity. It is important that problems are identified in relation to the requirements for improved productivity in the particular systems under investigation. Realistic targets for improvement need to be established that reflect both the improvements needed in the system and the likelihood that such targets can be achieved with the existing feed resources. In other words the following questions must be posed. Is it possible to achieve the measures being sought in the levels of one or more components of productivity given the existing nutritional resources? If not, what additional nutritional inputs are necessary?

There are three main ways in which nutritional deficiencies can be overcome; use of body reserves, more efficient use of basal-diet material (usually roughage of varying degrees of quality), and the use of specific supplements whether protein, carbohydrate, lipid or minerals. Some specific areas of research are outlined below, the relative importance of which will vary according to the system to which they are being applied and the component of productivity that is to be increased.

(ii) Scientific Scope and Proposed Programme Goals:

(a) Nutritive Value of forages and crop residues

In many areas of the world the nutritive value of locally available roughages and other feed stuffs is still inadequately known. An important component of the evaluation of nutritive value of forages is the animal production response. This may be examined initially by determining forage digestibility but ultimately it is related to the quantity and type of nutrients released upon digestion. This applies both to the rate and extent of degradation of fibre and protein in the rumen, the supply of protein, lipids and carbohydrates to the small intestine and to the mineral content of the forage. There is also evidence to show that straw from different varieties of cereals varies greatly in nutritive value and that such characteristics are not related to quality and yield of grain. Under this category work should focus particularly on:

- the determination of the rate and extent of degradation of locally available feeds and by-products together with crude protein and mineral content;
- the development of new methods of evaluating nutritive value of fibrous roughages;
- the investigation of the extent to which straw or stover from different varieties vary in nutritive value and the causes of such variation e.g. leaf/stem ratio.

(b) Feeding strategies:

In many areas of the world with fluctuating nutrient supplies (wet or dry seasons) animals are offered for sale at the end of the good seasons when prices are depressed and meat storage facilities inadequate. Similarly milk yields in lactating cows are depressed when nutrient supplies are decreasing. Manipulation of the use of body reserves and level of nutrition by supplementation are management tools that could be used for achieving production targets. Recent work also suggests that it may be possible to use internal fat stores both for maintenance, growth and lactation. Within this framework particular emphasis should therefore be given to studies aimed at:

- utilizing body tissue reserves for meeting production requirements (e.g. reproduction, draught power) during times of nutritional inadequacy. (Survival during times of drought is a particular case of this more general need).

Under this category likely areas of research would be:

- to investigate whether milk yield and reproductive rate can be maintained when lactating animals are given low quality roughages only but supplemented with undegraded protein. Quantifying the protein degradability characteristics of locally available plant proteins (eg. leguminous forages and tree leaves) and by-products as defined in (ii)a may need to be done in conjunction with supplementation trials.
- to determine whether by supplementation with undegraded protein, fat cattle at the end of the rainy season can be made to maintain weight or gain weight under conditions of feeding which supply considerably less than maintenance.

- to investigate the possible interactions between draught power, milk yield and reproduction in animals given low quality roughages.

and

- supplementation (e.g. rumen soluble N and S, protein, carbohydrates, lipid, macro and trace minerals) of basal roughage diets at the ruminal and post ruminal level and to increase nutrient supply for targeted production improvements.

Under this category the following are recommended as priority areas for attention.

- assessment of the importance of mineral deficiencies/toxicities as determinants of existing levels of production through diagnostic procedures and responses in the components of productivity in supplementation trials.
- establishment of comparative differences between species/breeds/strains of ruminants in the intake and digestibility of feeds and responsiveness to different supplementation and other dietary treatments. It may be important to study factors such as rumen fill, motility and turnover rates of solid digesta components and their metabolic consequences in the host animal.
- development of methods of efficiently and effectively supplying protein, carbohydrate and lipid through the processing of existing sources and identification of new alternative sources, and evaluating the response in terms of a relevant component of productivity.

(D) PUBLICATIONS

- (1) Improving the Productivity of Indigenous Animals in Harsh Environments with the Aid of Nuclear Techniques.

The publication arising from an FAO/IAEA Advisory Group Meeting held in Turkey in May 1985 has now been published and can be obtained from the Division of Publications, IAEA; price: Austrian Shillings 460.-- or equivalent paid in convertible currency or UNESCO coupons. Full details of the content of this publication were given in the previous edition of this Newsletter.

- (2) Nuclear and Related Techniques in Animal Production and Health

This publication represents the contributions made by the invited speakers and those who presented posters at the FAO/IAEA International Symposium on the "Use of Nuclear and Related Techniques in Studies of Animal Production and Health in Different Environments".

It will be available towards the end of September 1986 from the Division of Publications, IAEA; price: approximately Austrian Shillings 1,500.-- or equivalent paid in convertible currency or UNESCO coupons. Full details of the content of this book were given in the previous edition of the Newsletter.

(E) FORTHCOMING EVENTS

- (1) FAO/IAEA Training Course on "The Use of Radioisotope Techniques in Animal Reproduction", Maracay, Venezuela, 8-26 September 1986.

The prospectus for this Course has already been distributed to all countries in the Region.

- (2) Second FAO/IAEA Research Coordination Meeting on "Regional Network for Improving the Reproductive Management of Meat and Milk-Producing Livestock in Latin America with the Aid of Radioimmunoassay Techniques", San José, Costa Rica, 3-7 November 1986.
- (3) FAO/IAEA Regional Training Course on the "Use of Radio- and Enzyme Immunoassay Techniques in Studies on Animal Reproduction and Disease Diagnosis", Nairobi, Kenya, 3-28 November 1986.

Place: Department of Veterinary Physiology, University of Nairobi,
Kenya Agricultural Research Institute, Muguga
and International Laboratory for Research on Animal Diseases (ILRAD)

Date: 3 November - 28 November 1986

Deadline for nominations: 1 September 1986 (using the standard IAEA Training Course application form)

Participation: The course is open to 30 participants from African Member States of IAEA and FAO.

Language: The language of the course will be English.

Purpose of the course: 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.

Nature of the course: 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 diagnostics and animal reproduction will follow separate courses, the former being held at Muguga and ILRAD, and the latter at the University of Nairobi. It is absolutely essential therefore that candidates state on their application forms which part of the course they wish to follow.

Participants' qualifications: The course is intended for African scientists with a veterinary or animal science degree and who are actively engaged in research on ruminant 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.

The Nutrition Laboratory has completed the evaluation of 21 fibrous residues from 11 countries for their fermentation characteristics in the Rusitec. The data (such as production of VFA, fermenting gases and microbial matter) have been sent to the donor scientists for use in their own programmes.

The characterisation of 15 remaining samples is now underway and we hope to provide the data to the respective donors as soon as possible.

Our studies so far have clearly indicated that the Rusitec is a versatile in vitro system for measuring the fermentation characteristics of fibrous residue-based diets. Measurements made on conventional feed resources such as cereal straws, grasses and legume hays have been up to expectations indicating the usefulness of the Rusitec in screening feed resources prior to engagement on expensive animal experimentation. We now feel that the future role of the FRB would be twofold: (1) to characterise and evaluate non-conventional and new feed resources which may have a potential in the future as basal diets or as supplements to existing basal diets and (2) to formulate and test new diets for ruminant production systems in developing countries using locally available feed resources. We therefore ask ruminant nutritionists engaged in developing new feeding strategies to suit local conditions in developing countries, to send us new and potential feed materials for initial characterization in the Rusitec.

The development of the FAO/IAEA RIA progesterone kits (UNOLAB immunoassay reagents) is nearing completion although efforts to further simplify the procedure, and improve the accuracy and repeatability will continue. We wish to thank the twelve international laboratories who collaborated with the group in assessing the viability of the kits. Whereas most of the reports were extremely complimentary in laboratories where kits had been exposed to very high temperatures two reported mediocre results; subsequent research on improving the stability of the iodinated progesterone conjugate has resolved this problem. 200 progesterone kits (milk and blood) have been dispatched to date and we now await orders from Agency Research Contractors and Technical Assistance counterparts (see information for ordering procedure given below). Unfortunately, because of the increased cost of kit components, the kits will now market for US\$ 40/100 tube kit or ca. US\$ 300/1,000 tube bulk supply. For those ordering the kit the appropriate amount will be deducted from funds available under Research Contract and Technical Cooperation projects. A computerised system is presently being established to deal with the receipt of orders and dispatch of kits as well as establishing an external quality control service; it should be emphasized that the kits contain two QC samples for internal validity purposes.

Our Mexican trainee (Dr. Ana-Lilia Vasquez) and Dr. S. Uriyapongson from Thailand have finished their training and return home in early July; a new RIA trainee (Dr. Cyro Meivelles) from CENA, Piracicaba, Brazil, is staying for 10 weeks to learn solid-phase RIA techniques.

(G) ORDERING THE FAO/IAEA PROGESTERONE RIA KIT

Information concerning the technique and its scientific background is given in the article "Solid-phase radioimmunoassay (RIA) appropriate for use in developing countries", which will be published in the Symposium proceedings.

Two different sizes of kit will be produced. A 100-tube kit (sufficient for 40 samples measured in duplicate) is designed to meet the requirements of laboratories with a sample throughput of maximum 150 per

month. The costs for this kit will be US\$ 40 and this sum will be deducted from your research contract or technical assistance funds. Laboratories with a monthly throughput higher than 150 will be supplied with "bulk kits", which will decrease the costs per assay unit considerably. Such laboratories will be provided with all the stable reagents required for one year's work in advance; the radioactive tracer will then be shipped on a monthly basis.

In order to enable us to plan the shipments to you, it is essential that you answer the following questions and report by telex or cable to us. Your reply must reach us before the end of August 1986, otherwise your request cannot be handled before next year.

Please let us know:

- How many samples you have assayed for progesterone during the last 12 months? (September 85 - August 86).
- How many samples do you anticipate assaying during the next 12 months? (September 86 - August 87).
- Do you require kits for progesterone measurement in blood, milk or both?
- Are there seasonal peaks or distinct vacation periods in your laboratory work?
- In which animal species are you measuring progesterone?
- Do you have access to a good balance and pH meter?

To facilitate your answer by telex or cable, please use a formate and a code according to the following sample.

A laboratory assayed 1,000 samples from buffaloes last year. It requires milk kits sufficient for 50 samples per month during September, October and November, none in December and January, 100 samples per month in February, March, April and May and 50 samples per month in June, July and August. It needs blood kits sufficient for 100 samples per month during September, October and November, none in December, January, February, March, April and May and 50 samples per month in June, July and August. It has a good balance and a pH meter.

This lab would then send the following telex/cable:

1000 last year,
milk, SON 50, D 0, FMAM 100, JJA 50
blood, SON 100, D FMAM 0, JJA 50
buffalo
Bal, pH ok

Please send your answers to:

Animal Production and Health Section
International Atomic Energy Agency

either by telex: Telex No. 1-12645

or by cable: Cable Address: INATOM Vienna

Thank you for your cooperation.

(H) SABBATICAL/STUDY LEAVE POSITION IN RUMINANT NUTRITION

In 1987, there is a possibility that there will be some supplementary financial support to enable an animal nutritionist to spend his/her sabbatical or study leave either in the Section in Vienna or in the Section's Laboratory Unit at Seibersdorf. We would be interested in hearing from anyone with a background in ruminant nutrition, particularly in the study of rumen function and assessment of the nutritive value of feeds; experience in using radio- and/or stable isotopic methods is also essential.

Animal Production and Health Newsletter

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