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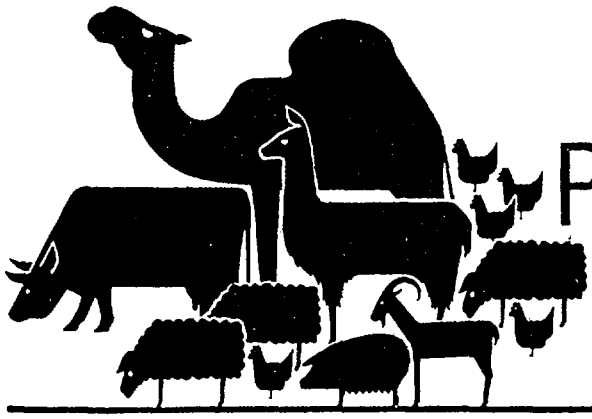

Animal Production and Health Newsletter

JOINT FAO/IAEA DIVISION OF ISOTOPE AND RADIATION APPLICATIONS
OF ATOMIC ENERGY FOR FOOD AND AGRICULTURAL DEVELOPMENT
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA

No. 1 January 1985

CONTENTS

Dear Colleague,

The Section's Newsletter appears for the first time in a new format which we hope is some improvement on the old one. If you don't like the colour scheme, blame Lars Edqvist because he chose it. (Jim Dargie would have preferred something in tartan!). Since this is the first issue produced with the new format, we have referred to it as No. 1; subsequent Newsletters will simply be marked 2, 3, 4, etc. Anyway, since the last up-date on our activities we've been kept busy organising Coordinated Research Programmes and Meetings, we've held a Training Course in Peru on reproduction and a Consultants Meeting in Vienna on pig production, and 3 further publications on various aspects of the Section's programme are now available. Details of these past activities are given in this Newsletter, as is information about programme implementation over the next 6 months or so.

As most of you are aware, the Section established a laboratory programme last January at Seibersdorf, near Vienna, to support and develop our activities. In this Newsletter is a description of what has been happening in relation to this laboratory, and of the services which we can already or will in the future provide to our collaborators. In this connection, we are pleased to announce that Dr. J.I. Richards, formerly of the Centre of Tropical Veterinary Medicine, Edinburgh and Somerset College of Agriculture & Horticulture, U.K. will be joining the Section as of 7 January 1985. Wyn has a great deal of experience in tropical agriculture, having worked in Kenya, Uganda, Costa Rica and elsewhere on animal development projects. His experience in animal reproduction will be a great asset to the Section, and particularly to its activities in Latin America, for which he will be responsible.

Finally, we wish you all the best for 1985.

James D. Dargie
Lars-Eric Edqvist
M.C.N. Jayasuriya

(A) PAST EVENTS

(i) FAO/IAEA Regional Training Course on Radioimmunoassay Methods in Animal Reproduction, Lima, Peru, 22 October - 16 November 1984

This course was organised and run in cooperation with the Government of Peru and the National Agrarian University, La Molina, Lima, Peru, and was attended by 16 participants from 15 Latin American countries. The programme of the course included lectures and practical exercises on the following main subjects: general principles of isotopes and radiation and of radioimmunoassay; reproductive hormones during puberty, estrous cycles, pregnancy; male endocrinology; reproduction in dairy and beef cattle, sheep, goats and alpaca; the post-partum period; radioimmunoassay of progesterone in milk and blood using tritiated and iodinated tracers.

The course was both successful and enjoyable. For this, the Agency has to thank many organisations and people including: the USAID through its Small Ruminant Collaborative Research Support Program which provided additional funds; Ing. Alberto Fujimori, the Rector of the National Agrarian University and his staff - particularly Ing. W. Vivanco who acted as the Course Director; the Course Co-Director, Dr. A. Gil (Colombia); the lecturers, Drs C. Galina (Mexico), T. Reimers, G. Stabenfeldt and W.Thatcher (USA); R. Taylor (Costa Rica), B. Murphy and H. Robertson (Canada), M. Garcia, C. Novoa and J. Sumar (Peru), and last, but by no means least (!), the trainees themselves who proved to be a particularly studious and well motivated group. We wish them well in their future work.

Names and Addresses of Participants

Mr. Alberto Raul Dick
Instituto Nacional de Tecnologia Agropecuaria (INTA)
ARGENTINA

Mr. Armando S. Islas Letelier
Universidad de Concepcion
CHILE

Mr. Felix Diaz Gonzalez
Universidad Nacional de Colombia
COLOMBIA

Mr. Rodolfo Pedroso Sosa
Cima-Minagri
CUBA

Mr. Felix Andres Aracena Diaz
Hospital Jose Maria Cabraly
REPUBLICA DOMINICANA

Mr. F. Patricio Villalba Barrera
Comision Ecuatoriana de Energia Atomica
ECUADOR

Mr. Oscar Luis Melendez Calderon
Centro de Desarrollo Ganadero
EL SALVADOR

Mr. Hiram Ordonez Chocano
Universidad San Carlos
GUATEMALA

Mr. Francisco Javier Escobar Medina
98000 Zacatecas, Zac
MEXICO

Mr. Armando Jose Castellon Padilla
Midinra,
NICARAGUA

Mr. Renato Orlando Barrera Fernandez
Instituto de Investigacion Agro-pecuaria
PANAMA

Mr. Roberto Cajes Moran
Facultad de Ciencias Veterinarias
PARAGUAY

Mr. Roberto Mario Tagle Bozzola
Facultad de Veterinaria
URUGUAY

Ms. Deisy Medina
Fac. Agronomia
Universidad del Zulia
VENEZUELA

Ms. Diana Chavez del Castillo
Universidad Nacional Agraria
PERU

Mr. Wilfredo Huanca Lopez
IVITA
PERU

(ii) First 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", 5-9 November 1984

This meeting was also held at the National Agrarian University, La Molina, Lima, Peru, and coincided with the third week of the Training Course. Again, the Agency must thank the Rector and the staff of the University for their excellent support and hospitality.

Background

Latin America is a region with vast and varied animal resources which consists not only of the conventional domesticated species (e.g. cattle, sheep, goats and water-buffaloes) but also indigenous species as the llama, alpaca and vicuna. Animal products in the form of meat, milk, wool and/or hides are important to all countries of the region. They provide nutrition and clothing for the human population, valuable export earnings, and perhaps most important of all, employment and income for a high proportion of the poorer people living in the rural and highland areas. The efficiency of livestock production is, however, invariably low e.g. cows having calves every second to third year instead of one calf per year. One way to improve livestock productivity is to improve reproductive efficiency. Analytical methods based on isotope markers are of particular value in studies of animal reproduction. Such techniques are simple, inexpensive, quick and robust.

The meeting assembled not only researchers having a research contract or a research agreement but also counterparts of ongoing Technical Cooperation projects in the area of animal reproduction. In total, 20 scientists participated.

In addition to presenting background information on his project, each participant described a work plan to be conducted during the next 15 months when it is intended to hold the next meeting under the programme. These work plans were discussed in detail with the programme's agreement holders, experts and consultants, and in some cases, altered considerably. Each participant now has a detailed work plan and renewal of each contract will depend upon progress made on studies to be conducted under this plan.

General goal

To develop practical management systems, based primarily on locally available resources, and the adaptation of technology to suit local conditions, that will improve reproductive efficiency of milk, meat and fibre producing animals belonging to small holders in rural areas.

Research projects with specific objectives relating to this goal might be carried out in the following areas:

1. Establishment of current reproductive efficiency

Since the current status of livestock improvement programmes will vary between individual countries, information on present reproductive status and causes of reproductive failure may or may not be available. Individual investigators should begin to compile information on the number of offspring/animal year from whatever sources are available. Once this is known, it may be possible to decide what degree of improvement is economically justified and potentially achievable in the immediate future. Reproductive efficiency will be influenced to a large extent by prevailing environmental and management conditions as well as by the genotype of the animals concerned, and each of these factors will vary between and within countries contributing to the programme. It is therefore important that to enable comparisons to be made between the performance of animals in different environments and/or management systems, some attempt is made to define both the animals and the conditions under which they are kept. It is recommended that as much data as possible are collected on the following variables:

(a) Environment

(i) Season of year.
(ii) Altitude.
(iii) Temperature.
(iv) Humidity.
(v) Pattern of precipitation.
(vi) Solar radiation (light intensity, day length).

(b) Animal description

(i) Species, breed, purpose type, identification number.
(ii) Average yield/quality of product.
(iii) Weight change during experimental procedure.
(iv) Age and distribution.

(c) Feed availability/nutritional status

(i) Note whether animals are maintained on natural or supplemented diet. Where appropriate define composition of diet.

(ii) Assess body condition through body scoring and weight measurement at appropriate experimental times.

(iii) Attempt to establish weight tables by measuring the animal's heart girth, for species and breed of experimental animal.

(d) Health status

(i) Obtain information on local disease status and record any change in health.

(e) Management systems

(i) Overall assessment of system e.g. good, bad, average.

(ii) Rearing-strategy e.g. early calf removal/suckling frequency, etc.

(iii) Health programme, e.g. drug treatment, deworming, vaccination, etc.

(iv) Feeding practice.

(v) Characteristics of system e.g. machine and/or hand milked, number of milkings, suckling plus hand milking, restricted suckling, presence or absence of male.

(vi) Size of unit.

(vii) Type of housing where appropriate.

Important parameters of reproductive efficiency

(a) Age and weight at puberty.
(b) Length of oestrous cycle, oestrus and anoestrus.
(c) Age and weight at first parturition, average and distribution.
(d) Percentage of animals cycling.

(e) Conception rate % = $\frac{\text{No. of animals pregnant}}{\text{No of breedings carried out}}$ x 100

(f) Services per conception = $\frac{\text{No. of inseminations to animals}}{\text{No of animals pregnant}}$

(g) Pregnancy rate % = $\frac{\text{No. of animals pregnant}}{\text{No of animals intended to be bred}}$ x 100

(h) Parturition rate % = $\frac{\text{No. of births/year}}{\text{No of animals in the unit}}$ x 100
e.g. calving rate

(i) Weaning rate e.g. beef = $\frac{\text{No. of animals weaned/year}}{\text{No of animals in the unit}}$

2. Determination of the major causes of reproductive failure

The resources available for supporting research programmes are restricted so efforts must be made to ensure these are directed towards solving major problems. Projects to study the causes of reproductive failure should be planned to determine the relative importance of the following causes:

(a) Failure to mate

(a) Detection of oestrous behaviour. Define oestrous behaviour and frequency of oestrous observations.

(b) Time and season of breeding, fertility of male (e.g. effect of season).

(c) Acyclicity, physiological (photoperiod, lactational anoestrus), environmental (e.g. undernutrition).

(d) Embryonic and fetal loss.

(b) Neonatal mortality.

3. Development of practical solutions

Once a particular problem has been identified as highly significant, further research should be initiated to develop practical solutions. Initially, this will probably involve controlled studies and this should be followed by field testing of any treatments that have provided encouraging results. Proven solutions could then be disseminated through extension programmes.

(iii) FAO/IAEA Consultants Meeting on "Use of Nuclear Techniques in Studies on Constraints on Small Farm Pig Production in Developing Countries", Vienna International Centre (V.I.C.), Vienna, Austria , 10-12 December 1984.

The Agency would like to thank the following for their advice in relation to the pig consultancy: Drs C. Devendra (Malaysia), S. Einarsson (Sweden), R.T. Haalstra (Netherlands), G.J. King (Canada) and A. Kunavongkrit (Thailand). The following is the main thrust of the recommendations made by the Consultation:

Background:

Trends in livestock production in developing countries indicate an increased productivity for pig and poultry meat and eggs. On the other hand, increases in production from ruminant animals have been attained largely by increasing numbers rather than productivity. During the 1970's pig meat replaced bovine meat as the most important meat product in developing countries (The State of Food and Agriculture, FAO, 1982).

Efficient, intensive pig production systems can produce over 2.3 litters farrowed and 20 or more piglets weaned per sow per year. The modern hybrid piglet, when provided with adequate amounts of balanced ration and protected from disease, can gain 1 kg for each 2.5 to 3.5 kg of feed and reach a market weight of 90 kg by 5 months of age. Maintaining this level of production requires considerable capital investment, energy and technical inputs which are not usually available, suited to and certainly not applicable to small farms in many developing countries.

Despite this situation many pigs are still reared on small farms where they form an integral component of farming systems involving animals and mixed cropping. Unlike the capital intensive larger farms which use a variety of exotic pig breeds and advanced technology, the small farms are more attuned to a subsistence level of operation in which the pig forms an important component of traditional agriculture. In terms of current importance, the position regarding pigs in animal based small farm systems ranks medium to high in many developing countries. Unlike the situation on advanced farms, fewer exotic breeds and less sophisticated traditional systems of management are employed. Indigenous or traditionally raised pigs on small farms in developing countriesmight be defined as animals that obtain nutrients for growth, maintenance and production primarily through forage and usually some supplementation with kitchen refuse plus other agricultural by-products not directly consumed by humans. Even modest increases in production efficiency obtained through more efficient use of currently available resources would improve the local nutrition and economy.

Small scale pig production under integrated farming systems has a number of characteristics which are worthy of keeping in perspective. Pig production forms only a part of the total farming activity - very seldom are

these animals reared on their own mainly because of the need to diversify, the subsistence level of production, and the less sophisticated nature of the enterprise; pigs are kept for a variety of reasons, the most important of which are meat production for mainly household consumption, as a source of supplementary income and as a source of security (e.g. pigs can be quickly purchased when money is available and sold for ready cash); pigs produce dung which is valued as a source of fertiliser for use in orchards for manuring fruit trees, crops and vegetables, as well as fish ponds; dung is also increasingly used in biogas production; the presence of pigs enables economic utilisation and recycling of available non-marketable by-products and crop residues; pigs are complementary to crop production in integrated systems involving also fish and duck production; and finally, the presence of pigs provides an ecological and economic stability to the total system.

The Consultants considered that in any future Coordinated Research Programme and/or Technical Cooperation Projects supported by the Joint FAO/IAEA Division emphasis should be given to multidisciplinary approaches rather than to simply efforts aiming at improving reproductive efficiency, nutrition and/or disease control. In any geographical region, a vast range of individual producer efficiencies will exist from reasonably competent to totally incompetent husbandry. The requirements for improvement, expectations and degrees of progress that can be anticipated will vary with current producer competence and his willingness to accept change. A coordinated research programme should address as many areas as possible and identify key producers at different levels of efficiency who are receptive to new ideas. Livestock improvement will only be achieved through a coordinated research effort directed towards solving major production limiting problems. In addition, this must be combined with the practical application of positive research results through demonstrations and an efficient extension effort. Researchers and extension workers will require instruction in new techniques and methodologies so that a training component would also be beneficial.

1. Assessment of present production systems

One important prerequisite for any contemplated pig research and development programme is a thorough assessment of the present status including the following: the indigenous and exotic genetic resources available; the available feeds and by-products that might be used for improved ration formulations; disease diagnostic, treatment and prevention facilities; research and extension services; marketing procedures; and potential for increased sales. The relatively short generation interval and reproductive cycle for pigs facilitates collection and analysis of data to determine production rates and efficiency. If a representative sample of a regional population can be positively marked for subsequent identification and observed in detail for 1 to 2 years, the performance summary should illustrate the factors which contribute towards or substantially reduce production. These may vary considerably even within regions due to different husbandry practices, extension and veterinary services. If some resources exist and an initial assessment indicates an increased domestic consumption and/or marketing potential, a research and development project can be justified to increase productivity through better utilization of available local resources. The major goal of such a project should be to increase production and profits in a practical manner by modifying rather than revolutionizing the present system.

2. Reproduction

Many previous reports have emphasized that animal reproduction is essential for animal production and that poor reproductive performance is a

major factor in reducing productivity in all countries. In pigs, reproductive efficiency is best measured by the number of piglets weaned per breeding female per year. This figure can vary from over twenty piglets/sow/year under good management conditions to as low as one or two per year in small scale pig production with poor management. The commonest causes of low or reduced reproductive efficiency under all conditions are: loss of piglets at birth or before weaning; prolonged intervals from weaning to conception, and delayed sexual maturity in gilts. These problems arise through nutritional deficiencies, high disease prevalence due to absence of vaccines, anthelmintics and veterinary services, plus a lack of extension workers to advise traditional livestock owners on better methods to utilize available resources and to assist with the implementation of practical technology.

The application of radioimmunoassay (RIA) and related techniques to measure reproductive hormones in biological material has become a powerful tool in investigations designed to improve reproductive function. The RIA for plasma progesterone would be particularly valuable in monitoring population samples to determine the onset of sexual maturity, the duration of post-weaning anoestrus, and the proportions of pregnant to anoestrus or cycling females under specific management conditions. The progesterone RIA could also be used to objectively determine the ovarian response to specific treatments. There is also a potential for using RIA of oestrone sulphate to monitor fetal development in pregnant pigs.

Recommendations for specific areas that might be investigated for potential implementation in traditional husbandry systems through an applied research project and associated extension service are:

(a) Survey of slaughtered pigs to determine prevalence of genital abnormalities, and if seasonal variations occur.

(b) Possibilities for and effect of supplementary feeding and management. Does this increase birth weight, weaning weight, piglet survival and/or reduce the interval from weaning to oestrus?

(c) Availability and fertility of boars and gilts. Do the fastest growing (most efficient) animals go to market before sexual maturity while the poorer converters remain, reach sexual maturity and produce the next generation? Do some boars have greater ability to resist high temperature and humidity which would result in better production of viable spermatozoa throughout the year?.

(d) The recognition and confinement of prepartum females to allow supervision of farrowing with the expectation that this would increase piglets survival.

(e) Farrowing area sanitation and facilities for piglet protection.

3. Nutrition

Feeding and nutrition of pigs is an important component influencing the efficiency of pig production. There are three main reasons for this. Firstly, feeding is the major cost of production in developing countries. Secondly, there exists considerable potential to utilize more completely, the variety of feed ingredients suited to feeding pigs, which is available from a vast reservoir of crop residues, agro-industrial by-products and non-conventional feed resources from annual and perenial crops. Thirdly,

improving the efficiency of using these locally available feed ingredients is associated with such distinct advantages as increased pig meat production, reducing the dependence on imported feeds, savings in foreign exchange, reducing problems of pollution, savings in foreign exchange, and increasing the economic benefits which in turn can also enhance the quality of life of subsistence small farmers.

Feeding systems that are in operation in developing countries are based on all or limited concentrate feeding. The first category is normally practised under intensive pig production or commercially oriented systems which depend upon either purchased concentrates from feed millers or self-mixed formulations.

Limited concentrates with supplements is often the method used by the small farmers in South East Asia, Central and South America and Africa. Energy and protein concentrates only provide a part of the nutrients required. Pigs are normally allowed to consume a supplementary diet of bulky, home grown feeds such as green crops, and agricultural by-products. Limiting the amount of concentrates minimises the cost of feeding. Use of supplementary bulky feeds provides a useful outlet for by-products that are not normally used for human consumption or are available in excess during certain periods of the year and which can be fed to pigs.

Recognizing these features and the need for more research and development in the area of feeding and nutrition of pigs, the consultation recommended that the following areas be given further attention:

(a) Detailed feed inventories are necessary to identify the feed ingredients available in small farm systems which are suited for feeding pigs. This should consider types and quantities produced as well as seasonality of production.

(b) Based on (a), there is need for assessment of ME values of non-conventional energy feeds and protein sources plus information on protein quality including an amino acid profile.

(c) Research on limited concentrate and supplementary feedingsystems. This should focus on those energy feeds that are not in competition with human requirements. These include waste bananas (Musa spp.), yams (Dioscorea alata), waste cassava (Manihot esculenta Crantz) and sweet potatoes (Ipomoea batatas). Similarly, much use can be made of such protein ingredients as palm kernel cake, rice bran, rubber seed cake and poultry excreta, etc. In addition, the value of such green forages as banana leaves (Musa spp.), cassava leaves (M. esculanta Crantz) sweet potatoes (I. batatas), water hyacinth (Eichornia crassipes) and also leucaena (Leucaena leucocephala) should be investigated.

(d) Multi-disciplinary studies including the interaction between plane of nutrition, reproductive performance and resistance to disease.

(e) The role and extent to which dietary fibre can be optimally incorporated into traditional feeding systems.

(f) Associated with (e) studies on digestive physiology in the hind gut of pigs.

(g) The significance of minerals (macro and micro) in small farm feeding systems.

4. Diseases

Diseases can seriously affect pig productivity not only through causing death but by impairing growth and reproductive efficiency. In addition, some diseases have a pronounced effect on the establishment and development of viable pig production systems, and also inhibit international trade in pig and pig products. Because of sub-optimal feeding, hygiene and veterinary services the impact of disease at the small farm level is likely to assume relatively greater importance than in intensive systems.

The major diseases of pigs are caused by viruses (e.g. foot-and-mouth, swine fever, African swine fever , pseudorabies,); bacteria (e.g. brucellosis, leptospirosis) and by protozoal and helminth parasites (e.g. trypanosomiasis, hydatids, trichinella); also, some of these infections have considerable importance not only in their own right but as public health hazards. Although some of these conditions continue to pose serious potential threats to all countries, it is in the economically developing countries of Asia, Latin America and Africa that their most devastating effects are felt.

Work on diseases of pigs should be directed towards:-

(a) improving disease diagnosis using RIA and/or EIA techniques in conjunction with standard viral, bacterial and parasitological methods;

(b) assessing vaccine quality, vaccination techniques and the immune responses of pigs to economically important infections;

(c) obtaining a better understanding of the epidemiology of infectious and parasitic infections and their impact on productivity.

The following topics are recommended as priority:

(i) Determining the economic importance of specific infections through studies or the prevalence and incidence of such infections and theimprovements in productivity resulting from the institution of control proceedures.

(ii) Assessment of the suitability of RIA and/or EIA techniques for the diagnosis of important viral, bacterial or parasitic diseases in pigs at the small farm level. This would require comparative studies between modern immunoassays and longer-established techniques in order to determine the most suitable approach to specific disease problems and large-scale screening.

(iii) Evaluation of the use of RIA and/or EIA for assessing the success of vaccination or other disease control systems and in epidemiological surveys of viral, bacterial or parasitic disease.

(iv) Application of RIA and/or EIA techniques to determine on the role of viral, bacterial or parasitic infections on reproductive efficiency and/or growth rate.

(v) Examination of the relationship between factors such as nutrition, genotype, season and physiological status (pregnancy, lactation, etc.) on immunological responses.

(B) STATUS OF COORDINATED RESEARCH PROGRAMMES

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

This programme will be terminated early in 1986 when it is intended to hold the final research coordination meeting.

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

This programme has a full complement of Contract and Agreement holders and therefore no further awards can be considered. Arrangements are now being made to hold the 2nd RCM in Morocco during 1985.

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

This programme is also full and therefore no further awards can be considered.

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

No further awards can be considered for this programme which is also full. The 1st RCM will be held at the International Laboratory for Research on Animal Diseases (ILRAD), Nairobi, 4-8 March 1985.

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

This programme is also full; arrangements are in hand to hold the 2nd RCM in Naples, Italy, from 6-10 May 1985.

(vi) 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 15 Contractors and 4 Agreement holders, and therefore we are not seeking further proposals.

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

This programme was initiated at the beginning of the year and so far 13 Contracts and 5 Agreements have been awarded. We are not seeking any further proposals for work on buffalo nutrition or reproduction, but it may be possible to award 2 further Contracts for studies on disease. Applications should be sent to the Agency as soon as possible, since it is hoped to arrange the first RCM under the programme during 1985. The following scientists and institutes will participate in this programme:

Institute	Investigator	Project
Universiti Pertanian Malaysia Dept.of Animal Sciences Serdang, Selangor MALAYSIA	Ms. N. Abdullah	Comparative studies in digestion between cattle and swamp buffalo.

Institute	Investigator	Project
Bangladesh Agric.Univ. Dept. of Animal Nutrit. University Campus Mymensingh, BANGLADESH	Dr. M.A. Akbar	Studies on the utilization of locally available feed-stuffs including agro-industrial by-products to improve buffalo production in Bangladesh.
Philippine Atomic Energy Commission Don Mariano Marcos Ave. Manila, PHILIPPINES	Ms.A.L. Alejandrino	A village-based integrated research to improve swamp buffalo production.
Faculty of Anim.Husbandry & Vet. Sciences Sindh Agric.University Tandojam, PAKISTAN	Dr. J. Dhanani	Evaluation of methods for inducing early activity post-partum - through changes in nutrition, patterns in suckling and other managerial practices.
Malaysia Agric. Research & Development Institute P.O.Box 12301 Kuala Lumpur 01-02, MALAYSIA	Dr. M.A. Dollah	Study on the reproductive performance of swamp buffalo.
Faculty of Vet. Science Biochemistry Unit Chulalongkorn University Henri Dunant Street Bangkok 10500, THAILAND	Ms. M. Kamonpatana	Determining the onset of puberty in swamp buffaloes under the breeding herd system.
University of Peradeniya Dept. of Vet. Clinical Studies Peradeniya, SRI LANKA	Dr. B.M.A.O. Perera	Comparative aspects of post-partum reproduction in buffaloes and other farm ruminants.
University of Tsukuba Inst. of Agriculture & Forestry Sakura-mura, Niihari-gun Ibaraki 305, JAPAN	Dr. H. Shimizu	Hormonal events during peri-oestrous period in the swamp buffalo.
Kwangsi Agric. College Dept. of Animal Science Kwangsi, Nanning PEOPLE'S REPUBLIC OF CHINA	Dr. Pei-chin Wang	Use of nuclear techniques to improve swamp buffalo production in China.
Faculty of Agriculture Dept. of Animal Science Khon Kaen University Khon Kaen 40002, THAILAND	Dr. W. Wongsrikeao	The influence of nutrition and patterns of suckling on post-partum cyclic activity in swamp buffaloes.

Institute	Investigator	Project
Balai Penelitian Ternak (BPT) P.O.Box 123 Bogor, INDONESIA	Dr. A. Bamualim	The productivity of Indonesian swamp buffaloes in relation to nutrition, reproduction and draught use.
CSIRO Davis Laboratory Division of Tropical Animal Science Private Mail Bag, P.O. Aitkenvale, Qld. 4814 AUSTRALIA	Dr. P. Kennedy	Studies on intake and digestion of low quality tropical forages.
Univers. of Peradeniya Dept. of Animal Science Peradeniya, SRI LANKA	Dr. S. Panditharatne	Effect of non-protein nitrogen, by-pass protein and fodder legumes on intake, digestibility, growth response and rumen parameters of buffalo fed urea treated rice straw.
Indian Veteterinary Research Institute Izatnagar 243 122 U.P. INDIA	Dr. U.B. Singh	Studies on urea molasses blocks in the diet of growing buffalo for meat production.
University of England Dept. of Biochemistry & Nutrition Armidale, N.S.W. 2351 AUSTRALIA	Dr. R.A. Leng	The nutrition of buffaloes for increased productivity.
Bangladesh Agricultural University International Centre for Diarrhoea Diseases Res. Dept. of Vet. Medicine Dhaka, BANGLADESH	Dr. M. Ahmed	Use of enzyme immunoassay (EIA) for the detection of diarrhoeal diseases of buffaloes and comparative evaluation with radioimmunoassay (RIA).
Universiti Pertanian Malaysia Serdang, Selangor, MALAYSIA	Dr. R. Sani	Infectious diseases of buffaloes.

(C) NEW COORDINATED RESEARCH PROGRAMME

The Agency has agreed in principle to support a new Coordinated Research Programme in animal health. This programme will be on disease diagnostics and should appeal to scientists and institutes with an interest in developing modern immunoassay methods such as RIA and ELISA for diagnosing viral, bacterial and/or parasitic infections of livestock, and comparing the sensitivity of these methods with those which are currently used. Proposals for contracts under this programme should be sent to Mr. P.M. Cate of the Contracts Administration Section of the IAEA by 30 April 1985. Below is a brief description of the scope and goals of this programme:

1. Title: Improving the Diagnosis and Control of Infectious and Parasitic Diseases of Livestock in Developing Countries with the Aid of Radioimmunoassay and Related Techniques

2. Scientific Background:

Livestock diseases adversely affect food production in all parts of the world. The enormous wastage resulting from disease can be guaged from the fact that more than 50 million cattle and buffaloes and 100 million sheep and goats die each year, the productivity and reproductive efficiency of many millions more are seriously reduced, and vast quantities of animal products are condemned at slaughter. In addition, some diseases have a pronounced effect on the establishment and development of viable animal industries, inhibit international trade in animals and animal products, and have severe effects upon crop production in those areas where livestock provide draught power (especially at the small-farm level).

The major diseases of food-producing animals are caused by viruses (e.g. foot-and-mouth, rinderpest, African swine fever); bacteria (e.g. brucellosis, leptospirosis) and by protozoal parasites (e.g. babesiosis and trypanosomiasis); also, a number of helminth infections (e,g. hydatids and trichinella) have considerable public health importance. Although some of these conditions continue to pose serious potential threats to all countries, it is in the economically developing countries of Asia, Latin America and Africa that their most devastating effects are felt. Disease control is therefore a high priority requirement for the veterinary services of these countries.

Paramount to the control of animal diseases is rapid and accurate diagnosis. Not only does this enable identification and treatment of cases and carriers and/or removal of reservoirs of infection, it also increases the effectiveness of vaccination strategies. In many instances, diagnosis is based solely on clinical observations, but since the clinical signs of some diseases vary or cannot be differentiated from others, such observations should be supported by isolation and identification of the organism concerned. However, some organisms cannot be easily isolated or grown in culture, the procedures are often time-consuming, and the results are obtained too late to institute effective therapy or other control measures. Serological immunoassay tests are therefore also widely employed as tools for diagnosis. These assays are based on the fact that infectious agents can be identified by a specific antigen-antibody reaction, and the tests themselves either involve the detection of organism-specific antigens or detection of an altered antibody status.

Until recently, diagnostic immunoassays have involved tests such as classical neutralisation, complement fixation, immunofluorescence or gel diffusion. Although producing a result within one to a few days, these tests are often cumbersome and inferior in terms of sensitivity, precision and through-put to the more modern radio- and enzyme immunoassays (RIA and EIA) which now cover about 90% of the routinely reported tests in the research and diagnostic fields. Although there are a number of RIA and EIA systems available, the form which has attained most widespread usage for diagnosis is the solid-phase assay in which antigens or antibodies are passively adsorbed onto microtitre polystyrene or polyvinylchloride plates or tubes and reacted with the test material. Subsequently, a radio- or enzyme-labelled antibody is added, followed in the case of EIA by an enzyme substrate which changes colour on degradation. The amount of radioactivity or colour measured is a function of the amount of antigen or antibody in the test material and the end result can be assessed objectively in simple manual counters or colorimeters. For

large-scale testing, multi-well manual gamma-counters or microtitre plate colorimeters may be employed.

In June 1983, the Joint FAO/IAEA Division convened a Consultants Meeting in Vienna to review the applications of nuclear and related techniques in the study, diagnosis and control of livestock diseases in developing countries (see Section on publications ii. of this Newsletter). The consultants recognised the expertise and experience of the Animal Production and Health Section of this Division in promoting the widespread development and application of RIA and related techniques to the study and improvement of reproductive efficiency of animals kept at the small-farm level. They further noted the similar technical basis of RIA and non-isotopic assays such as EIA, and recommended that the Division should embark on supporting programmes of research and development involving the use of both techniques.

3. Scientific Scope and Proposed Programme Goals:

The programme will be directed towards:

(a) improving the diagnosis of infectious and parasitic diseases of ruminant livestock and pigs using radioimmunoassay and/or enzyme immunoassay techniques;

and

(b) employing these tests to obtain a better understanding of the factors affecting the epidemiology of such infections and their impact on productivity.

The following topics are recommended as priorities for attention:

(i) Assessment of the suitability of RIA and/or EIA techniques for the diagnosis of important viral, bacterial or parasitic diseases in tropical and subtropical countries. This would require comparative studies between these modern immunoassays and and longer-established techniques in order to determine the most suitable approach to specific disease problems.

(ii) Evaluation of the use of RIA and/or EIA in epidemiological surveys of viral, bacterial or parasitic disease.

(iii) Evaluation of the use of RIA and/or EIA for assessing the success of vaccination or other disease control campaigns.

(iv) Application of RIA and/or EIA techniques to determine on the role of infectious or parasitic disease on reproductive efficiency and/or growth rate.

(v) Examination of the relationship between such factors as nutrition and genotype on the resistance of livestock to viral or bacterial infections.

(D) PUBLICATIONS

(i) "How to Obtain Support for Animal Science Projects in Developing Countries from the Joint FAO/IAEA Division". A copy of this 11-page brochure is enclosed with this Newsletter.

(ii) The publication arising from the Consultants Meeting on "Nuclear Techniques in Tropical Animal Diseases and Nutritional Disorders" is now available. It can be obtained from: Division of Publications, International Atomic Energy Agency, Subject Group I, Life Sciences/Animal Sciences; Panel Proceedings Series; Price: Austrian Shillings 420,-- or equivalent paid in your local currency or UNESCO coupons. In addition to the recommendations from the meeting, it contains the following articles:

"Radioimmunoassay and related procedures in diagnosis and study of viral infections of domestic animals" - J.R. Crowther

"Immunoassays based on enzymes and fluorescence for serodiagnosis of livestock infections" - R.H. Jacobson

"Causes of post-partum anoestrus in cattle in the tropics" - W. Hansel, H.W. Alila

"Radioimmunoassay techniques and reproductive management of livestock in North Africa" - A. Lahlou-Kassi, H. Lakhdissi

"Some aspects of endotoxins and corpus luteum function in ruminants" - L.-E. Edqvist, G. Fredriksson, H. Kindahl

"Mineral and metabolic disorders of livestock with particular reference to copper, cobalt and phosphorus" - A.C. Field

"Minerals and rumen function" - R.H. Smith

"Isotope techniques in studies of selenium deficiency and toxicity syndromes in farm animals" - W.W. Giese

"Radioisotope techniques in studies on the metabolism of calcium, iodine and iron in ruminants" - F.W. Lengemann

"Nuclear techniques in the study of pathogenesis and immunology of trypanosomiasis" - P.H. Holmes

Nuclear techniques in the study of genetic resistance to gastrointestinal nematode infections in sheep" - J.D. Dargie

"Isotope-based immunological techniques: their use in assessment of immune competence and the study of immune responses to pathogens" - W.P.H. Duffus

"Nuclear Techniques in babesiosis and anaplasmosis" - I.G. Wright

"Nuclear techniques in the study of East Coast fever (Theileria parva infection of cattle) - A.D. Irvin

(iii) The publication arising from the Agency's Coordinated Research Programme on "Use of Nuclear Techniques to Improve Domestic Buffalo Production in Asia" is now available. It can be obtained from the

Division of Publications, International Atomic Energy Agency, Group I, Life Sciences/Animal Sciences; price: Austrian Shillings 440,-- or equivalent paid in your local currency or UNESCO coupons. In addition to recommendations for future studies, this book contains the following articles:

"Improving domestic buffalo production in Asia" - P. Mahadevan (FAO)

"Studies on reproductive endocrinology and factors influencing fertility in dairy and draught buffaloes in Sri Lanka" - B.M.A.O. Perera et al. (Sri Lanka)

"Post-partum anoestrus in the suckled swamp buffalo" - M.R. Jainudeen et al. (Malaysia)

"Reproductive status and synchronisation of oestrus for predetermined insemination of Philippine swamp buffalo raised by smallholder farmers" - V.G. Momongan et al. (Philippines)

"Key reproductive hormones to understanding of endocrine patterns and their applications in swamp buffalo" - M. Kamonpatana (Thailand)

"Patterns of luteinizing hormone and progesterone in the Philippine water buffalo (carabao)" - A. Alejandrino et al. (Philippines)

""The endocrinology of the post-partum period in dairy ruminants" - L.-E. Edqvist et al. (Sweden)

"Research and development in buffalo reproduction at BPT-CIAWI" - I.C. Fletcher (Indonesia)

"Hormonal profiles in buffalo bulls" - P.K. Dwaraknath et al. (India)

"The utilization of alkali treated rice straw supplemented with cheap non-protein nitrogen in buffalo production in Sri Lanka" - M.C.N. Jayasuriya and M. Karunaratne (Sri Lanka)

"Effect of urea-molasses-mineral block lick on the growth performance of caracows kept on themeda pasture of Central Luzon during the wet season" - S.P. Neric et al. (Philippines)

"The potential of solidified molasses-based blocks for the correction of multi-nutritional deficiencies in buffaloes and other ruminants fed low quality agro-industrial by-products" - R.A. Leng (Australia)

"Laecaena and cassava tops as supplements for buffaloes fed local grass" - C. Hendratno et al. (Indonesia)

"Immunological responses of pregnant swamp and murrah buffalo cows and calves to Toxocara (Neoascaris) Vitulorum infection" - Amerasinghe et al. (Sri Lanka)

"Utilisation of water by buffaloes in adapting to a wet-tropical environment" - S.S.E. Ranawana et al. (Sri Lanka)

"Improvement of the productivity of the swamp buffalo of S.E. Asia" - J.E. Frisch and J.E. Vercoe (Australia)

(iv) Laboratory Training Manual on "Use of Isotope Techniques in Animal Nutrition". This is now being edited and should be available by mid-1985.

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

The ruminant nutrition laboratory at Seibersdorf is now fully operational with a 4-vessel rumen simulator (RUSITEC) and other supporting equipment. This laboratory will supplement the existing training programmes of the Division and provide research support for our current Research Contract and Technical Cooperation programmes. Plans are underway to construct animal accommodation so that fistulated sheep may also be used.

The first nutrition training course is being planned for August 1985. Details regarding the course is given elsewhere in this Newsletter. In addition to this, initial steps have been taken to establish a "Fibrous Residue Bank" at the laboratory to support the on-going research projects of our contract holders. It is intended to study the rumen fermentation patterns of important fibrous residues using the RUSITEC and to make this information available to the respective contract holders so that it will supplement their own results on these residues. We wish to urge the contract holders, who have already been contacted by letter, to support this new programme as it would help to add a great deal of information to our knowledge of fibrous residues as ruminant feedstuffs.

The immunoassay laboratory is gradually being developed. At present, experiments are being undertaken with the goal of developing a progesterone RIA system using iodinated tracer for distribution to contract holders and counterparts of Technical Cooperation projects. Two different separation systems-polyethylene glycol and solid phases (coated tube), are being tested. At this stage, the laboratory has the following antisera available for distribution to contract holders and counterparts. These can be obtained by writing to the Section.

progesterone antisera to 4-pregnen-11α-ol-3,20-dione hemisuccinate:BSA
oestradiol-17α antisera to 1,3,5(10)-estratrien-3,17β-diol-6-one 6-CMO:BSA
testosterone antisera to 4-androsten-17β-ol-3-one 3-CMO:BSA
LH antisera to ovine LH cross reacts with all known LH (from Dr. G. Niswender)

(F) FORTHCOMING EVENTS

(i) First Research Coordination Meeting of "Improving the Productivity of Sheep and Goats with the Aid of Nuclear Techniques", ILRAD, Nairobi, 4-8 March 1985.

(ii) Second Research Coordination Meeting of "Optimizing Grazing Animal Productivity in the Mediterranean and North African Regions with the Aid of Nuclear Techniques", Naples, May 1985.

(iii) Second Research Coordination Meeting of "Use of Nuclear Techniques in the Study and Control of Parasitic Diseases of Farm Animals", Rabat, 1985.

(iv) FAO/IAEA Regional Seminar for Developing Countries in Africa and the Middle East on "Research Using Nuclear Techniques Aimed at Improving Meat, Milk and Wool Production from Ruminant Animals", Ankara, Turkey, 3-7 June 1985. This Seminar was announced in the last Newsletter and everyone on the mailing list from the Regions concerned was sent a letter in September about the scope of the Seminar and how to make an application to participate.

(v) FAO/IAEA Advisory Group Meeting on "Improving the Productivity of Indigenous Animals in Harsh Environments with the Aid of Nuclear Techniques", Ankara, Turkey, 3-7 June 1985.

(vi) FAO/IAEA Training Course on Ruminant Nutrition - Animal Production and Health Section Laboratory, Seibersdorf, Austria, 26 August - 20 September 1985.

Nature of the course:

The course will deal briefly with the principles of radiation and procedures for counting beta and gamma emissions. Safety aspects of handling radioactive isotopes will be considered.

An advanced lecture course on rumen function and manipulation will be given with particular reference to the biochemistry and microbiology of the rumen, lignocellulose and protein digestion, principles of energy supply and transfer and of lipid metabolism in the rumen. In addition, tutorials and discussions will be held on the use of radio- and stable isotopes in nutritional studies particularly emphasizing the use of tracers in the measurement of end products of digestion such as volatile fatty acids and microbial biomass.

Practical classes will involve work with fistulated animals and a rumen simulator. These exercises will focus on methods of feed evaluation and methods for assessing and optimising rumen function. Students will also become familiar with procedures for measuring of end products of digestion.

All participants are expected to present their data at the end of the training course as a short scientific paper.

Participants' Qualifications:

Applicants should have at least an M.Sc. or an equivalent degree in agriculture/animal science or veterinary science and be currently involved in ruminant nutrition research. Although desirable, no previous experience in the use of radioactive isotopes is required. After the course, participants will be expected to continue their research investigations and to use their newly acquired knowledge in the future conduct of their research programmes. It is essential that participants have a good knowledge of the English language so that they can follow the course without difficulty.

Application procedure:

Nominations should be submitted in duplicate on the standard (yellow) IAEA nomination form for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the national Atomic Energy Authority, the Ministry of Agriculture or the Office of the United Nations Development Programme); they must be received by the International Atomic Energy Agency, P.O.Box 100, A-1400 Vienna, Austria, not later than 1 April 1985. Nominations received after that date and applications sent direct by individuals or by private institutions cannot be considered.

(G) SABBATICAL - STUDY LEAVE POSITION

If anyone, particularly with a background in immunodiagnostic techniques, is interested in spending a sabbatical or study leave working either in the Section in Vienna or in the Section's Laboratory at Seibersdorf, we would appreciate hearing from you. There should be some supplementary financial support for such a position.

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