

**INTERNATIONAL ATOMIC ENERGY AGENCY
P U B L I C A T I O N S**

2002



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**Nuclear
Techniques
in Food and
Agriculture**

1990–2002



IAEA

International Atomic Energy Agency

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This catalogue lists all sales publications, including technical documents (TECDOCs), of the International Atomic Energy Agency issued between 1 January 1990 and 31 December 2002. It is divided into two parts. The first part lists all sales publications in alphabetical order by subject category whereas the second part lists all TECDOCs by the same criteria.

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NUCLEAR TECHNIQUES IN FOOD AND AGRICULTURE

Food Irradiation

ASIAN REGIONAL CO-OPERATIVE PROJECT ON FOOD IRRADIATION PHASE II: TECHNOLOGY TRANSFER Panel Proceedings Series

This publication includes the final reports of work carried out by different institutions under the scope of the Asian Regional Co-operative Project on Food Irradiation (RPFI), Phase II, which were presented at the final FAO/IAEA research co-ordination meeting, Bangkok, Thailand, 31 October to 4 November 1988. Phase I of the Asian RPFI programme demonstrated the technoeconomic feasibility of irradiation for processing of food items of economic importance to the region, e.g. mangoes, fishery products, onions and spices. Effective transfer of food irradiation technology to the industry in the region was implemented in Phase II, resulting in successful market testings of several irradiated food items, e.g. potatoes, onions, garlic, dried fish, spices, apples, oranges, Chinese sausages and Thai fermented sausages. Under Phase II, which was carried out from 1985 to 1988, the following objectives were covered: (1) disinfestation and decontamination of stored products; (2) improvement in the hygiene of processed seafood; (3) insect disinfestation of fruits for quarantine purposes; and (4) sprout inhibition of root crops.

STI/PUB/883 (181 pp., 14 figures, 16 × 24 cm; 1992)

ISBN 92-0-100492-3

Price: €36.34

COMBINATION PROCESSES FOR FOOD IRRADIATION Panel Proceedings Series

Proceedings of a final research co-ordination meeting of the final research co-ordination programme on irradiation in combination with other processes for improving food quality organized by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Pretoria, South Africa, 27 February to 3 March 1995. The proceedings contain the most up to date information on the use of irradiation in combination with other food processes for (1) a significant extension of the shelf-life of meat, fish, fruits and vegetables; (2) enhanced microbiological safety of fresh and processed food, including prepared meals; (3) expansion of the

range of food irradiation applications, from individual food items to ready to eat food and shelf-stable meals; and (4) a reduction in energy requirements for food processing.

STI/PUB/1031 (254 pp., 35 figures, 16 × 24 cm, 1998)

ISBN 92-0-105096-9

Price: €58.14

COST-BENEFIT ASPECTS OF FOOD IRRADIATION PROCESSING

Proceedings Series

Proceedings of a symposium jointly organized by the IAEA, FAO and WHO, Aix-en-Provence, 1–5 March 1993. Natural isotopes are among the most powerful tools for investigating past and current environmental changes. The purpose of the symposium was to evaluate the costs and benefits of irradiation for treating various food items either alone or in combination with other processes. The evaluation covered applications of the technology in terms of reducing food losses as well as the possible economic impact of irradiation in controlling or reducing certain food-borne illnesses and in expanding trade in certain food items. Discussion focused on the economic benefits of irradiation to control a number of food-borne diseases, especially those originating from the consumption of food of animal origin, and on the potential economic benefit from radiation as a quarantine treatment for fresh fruits and vegetables.

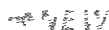
Contents: Keynote address; Food safety; Food losses; Irradiation facilities; Food trade; Technology transfer; Commercial and new applications.

STI/PUB/905 (505 pp., 75 figures, 16 × 24 cm; 1993)

ISBN 92-0-000393-1

Price: €101.74

DOSIMETRY FOR FOOD IRRADIATION



Technical Reports Series No. 409

The recognition and application of irradiation as a sanitary and phytosanitary treatment of food is becoming increasingly important. This report highlights the importance of proper dosimetry systems to ensure the compliance of trade in irradiated food with national and international standards. It provides the most recent data and information on radiation dosimetry as applied to food irradiation.

Contents: 1. General aspects of food irradiation; 2. Fundamentals of dosimetry; 3. Irradiator design concepts; 4. Process validation; 5. Facility operation and process control; 6. Dosimetry systems;

Appendix I: Dosimetry procedures: Fricke and PMMA; Appendix II: Calibration of spectrophotometers; Annex I: Practical irradiator designs; Annex II: Dosimetry requirements and applications: A checklist.

STI/DOC/010/409 (161 pp., 39 figures, 16 × 24 cm; 2002)

ISBN 92-0-115502-6

Price. €38.50

**INSECT DISINFESTATION OF FOOD AND
AGRICULTURAL PRODUCTS BY IRRADIATION
Panel Proceedings Series**

Proceedings of the final research co-ordination meeting, Beijing, China, 25–29 May 1987. The proceedings contain the results of the investigations presented by the participants of the Co-ordinated Research Programme, and include a review of the papers and a summary of the conclusions and recommendations. The papers deal with radiation disinfestation of cereals, beans, pulses, oilseeds, copra, dates and tobacco leaves. The research findings show that the advantages of this method are that there are no undesirable residues in foods, no resistance developed by the insects and no significant changes in the physicochemical properties or nutritive value of the treated products. Another important aspect under consideration was the development of suitable packaging materials for controlling reinfestation of irradiated products.

STI/PUB/895 (174 pp., 4 figures, 16 × 24 cm; 1991)

ISBN 92-0-111191-6

Price: €34.88

**USE OF IRRADIATION AS A QUARANTINE
TREATMENT OF FOOD AND AGRICULTURAL
COMMODITIES
Panel Proceedings Series**

Proceedings of the final research co-ordination meeting organized by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Kuala Lumpur, Malaysia, 27–31 August 1990. The Co-ordinated Research Programme (CRP) was initiated in 1985 with the purpose of determining the radiation doses required to provide quarantine security from insects and other pests infesting food and agricultural commodities in trade, assessing the tolerance of host commodities to the radiation dose(s) required to provide quarantine security and distributing information on the possible use of irradiation as a quarantine treatment of food and agricultural commodities to interested parties. The results of the work carried out under this CRP by laboratories in several countries have demonstrated that irradiation is a viable alternative to ethylene dibromide fumigation of food. These proceedings include

the final reports of work carried out by the scientists who co-operated in this CRP, as well as review papers presented at the Second Task Force Meeting on Irradiation as a Quarantine Treatment of Fresh Fruits and Vegetables held in Bethesda, Maryland, USA, in January 1991

STI/PUB/873 (220 pp., 13 figures, 16 × 24 cm, 1992)

ISBN 92-0-102992-6

Price: €43.60

USE OF IRRADIATION TO CONTROL INFECTIVITY OF FOOD-BORNE PARASITES

Panel Proceedings Series

Proceedings of a final research co-ordination meeting, Mexico City, 24–28 June 1991. The purpose of the meeting was to present the results of the Co-ordinated Research Programme implemented in 1986. These findings established conclusively the potential for application of food irradiation in the control of liver flukes, tapeworms, roundworms, trichinosis, toxoplasmosis, etc. The summary report includes the conclusions and recommendations of the participating researchers.

STI/PUB/933 (139 pp., 7 figures, 16 × 24 cm; 1993)

ISBN 92-0-103193-9

Price: €29.07

Insect and Pest Control

EVALUATION OF GENETICALLY ALTERED MEDFLIES FOR USE IN STERILE INSECT TECHNIQUE PROGRAMMES

Panel Proceedings Series

Proceedings of a final research co-ordination meeting held in Clearwater, Florida, 11–13 June 1994. There is an increasing use of the sterile insect technique (SIT) in control of the medfly, *Ceratitus capitata*. In the early 1980s it was recognized that the release of sterile males only of the medfly, *Ceratitus capitata* (Wiedemann) would have many advantages over releases of both sterile males and females in the application of the SIT. This stimulated the development of genetic sexing strains for the medfly mainly through FAO/IAEA co-ordinated research programmes (CRPs). This publication represents the completion of a second CRP on the subject and demonstrates the high efficiency that is now being achieved by strains in the field.

STI/PUB/1038 (112 pp., 22 figures, 16 × 24 cm; 1997)

ISBN 92-0-103897-6

Price: €29.07

GENETIC SEXING OF THE MEDITERRANEAN FRUIT FLY
Panel Proceedings Series

Proceedings of a final research co-ordination meeting, Colymbari, Crete, 3–7 September 1988, summarizing the research and development findings of the IAEA's programme to develop a genetic sexing method for the medfly by which only sterile males would be released. Great progress has been made in medfly genetics, including the development of experimental genetic sexing strains.

Contents: I. Introduction; Part I: Genetics, cytogenetics and population genetics; Part II: Genetic sexing of *Ceratitis capitata* by morphological, biochemical and other means; Part III: Recommendations, Annex and List of Participants.

STI/PUB/828 (224 pp., 26 figures, 16 × 24 cm; 1990)
ISBN 92-0-111190-8
Price: €43.60

LABORATORY TRAINING MANUAL ON THE USE
OF NUCLEAR TECHNIQUES IN INSECT RESEARCH
AND CONTROL — Third Edition
Technical Reports Series No. 336

This manual replaces the Laboratory Training Manual on the Use of Isotopes and Radiation in Entomology, Technical Reports Series No. 61, published in 1977. An extensive revision of the isotopes part of the manual has been made and a new section on the sterile insect technique (SIT) has been added (including an introduction to the history and development of SIT, the theory and mathematical concepts, the general and specific requirements, case studies and laboratory exercises). The manual is intended to help entomologists and others responsible for the entomological research and control of insects in developing countries to become familiar with the potential use of isotopes and radiation.

Contents: Part I. Radiation safety; Part II. Radiation and isotopes; Part III. Radiation detection and assay of radioactivity; Part IV. Application to entomological problems; Part V. Sterile insect technique; Part VI. Glossary of some basic terms and concepts.

STI/DOC/10/336 (183 pp., 5 figures, 16 × 24 cm; 1992)
ISBN 92-0-101792-8
Price: €40.70

**MANAGEMENT OF INSECT PESTS: NUCLEAR AND
RELATED MOLECULAR AND GENETIC TECHNIQUES**
Proceedings Series

Proceedings of a symposium jointly organized by the IAEA and FAO, Vienna, 19–23 October 1992. In the past decade significant progress has been made in overcoming many of the difficulties of biologically based methods of pest management. Particularly important are the advances made in the field of molecular technology and biotechnology. Presentations in this symposium focus on advances and trends in insect control and eradication, genetic engineering and molecular biology, insect genetics, operational SIT programmes, F_1 sterility and behaviour, biocontrol, tsetse fly R&D, and quarantine

Contents: Genetic engineering and molecular biology; Genetics; Operational programmes; F_1 sterility and insect behaviour; Biocontrol; Research and development on the tsetse fly; Quarantine.

STI/PUB/909 (669 pp., 98 figures, 16 × 24 cm, 1993)

ISBN 92-0-000293-5

Price. €138.08

**RADIATION INDUCED F_1 STERILITY IN
LEPIDOPTERA FOR AREA-WIDE CONTROL**
Panel Proceedings Series

Proceedings of the final research co-ordination meeting organized by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Phoenix, Arizona, 9–13 September 1991. Genetic control of lepidopterous pests includes the environmentally benign use of the sterile insect technique as well as the use of inherited sterility, which is especially pronounced in the first filial (F_1) generation following the exposure of the parents to substerilizing doses of ionizing radiation. In the case of inherited sterility, the F_1 generation is reared in the field, thereby reducing costs. Some lepidopterous species can be mass reared in factories, stockpiled in diapause, irradiated and activated for release in synchrony with the wild population. This method has been highly successful since 1968 in protecting 0.5 million hectares of cotton in the San Joaquin Valley of California from the pink bollworm. This report presents information mainly on the initial phases in the development of the use of inherited sterility to manage populations of the corn earworm, codling moth, Asian corn borer, European corn borer, diamondback moth, cotton leafworm, fall army worm, tropical army worm, gypsy moth, pink bollworm and wild mulberry silkworm.

STI/PUB/929 (162 pp., 28 figures, 16 × 24 cm; 1993)

ISBN 92-0-101793-6

Price: €33.43

**STERILE INSECT TECHNIQUE FOR
TSETSE CONTROL AND ERADICATION**
Panel Proceedings Series

Proceedings of the final research co-ordination meeting organized by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Vom, Plateau State, Nigeria, 6–10 June 1988. The proceedings contain the final reports (15) of scientists co-operating in a five year co-ordinated research programme. Its main objectives were: (1) to provide a research base and support for ongoing and future tsetse control/eradication programmes involving the application of SIT; (2) to develop methods for evaluating and monitoring tsetse SIT campaigns; and (3) to develop strategies for incorporating SIT into national and regional (area-wide) tsetse and trypanosomiasis control programmes. Included in this volume are reports of two successful SIT programmes, one in Burkina Faso covering 3000 km² and another in Nigeria covering 1500 km².

STI/PUB/830 (228 pp., 60 figures, 16 × 24 cm; 1990)

ISBN 92-0-111390-0

Price: €45.06

**USE OF IRRADIATION TO CONTROL
INFECTIVITY OF FOOD-BORNE PARASITES**
Proceedings Series

(See under Food Irradiation, p. 8)

Mutation Plant Breeding

**INDUCED MUTATIONS AND MOLECULAR
TECHNIQUES FOR CROP IMPROVEMENT**
Proceedings Series

Proceedings of a symposium jointly organized by the IAEA and FAO, Vienna, 19–23 June 1995. The aim of the symposium was to review current aspects of mutation and molecular biology techniques for use in crop improvement and to bridge the gap between practical plant breeding and molecular techniques. Problems of crop improvement worldwide, and their possible solution, were discussed. It was concluded that use of all available approaches, including mutation and molecular biology techniques, will be

crucial to future plant breeding programmes in order to meet the world's food production challenges.

Contents: Opening Session, Plant breeding: Problems and current techniques; Seed quality; Apomixis and F_1 hybrids; Plant pathology and disease resistance; Genome architecture, genome manipulation and comparative gene mapping; Methylation and gene expression; Molecular markers: Part 1: Application of DNA based marker mutations for improvement of cereals and other sexually reproduced crop species; Part 2: Use of novel DNA fingerprinting techniques for the detection and characterization of genetic variation in vegetatively propagated crops; Stress tolerance; Genetic transformation, Looking into the future: Looking into model plants; Biotechnology in developing countries; Current application of mutation techniques; Molecular markers and genetic transformation for crop improvement (poster session); Mutation techniques and biotechnology for crop improvement (poster session).

STI/PUB/972 (748 pp., 94 figures, 16 × 24 cm; 1995)

ISBN 92-0-104695-2

Price, €156.97

**PLANT MUTATION BREEDING FOR
CROP IMPROVEMENT**
Proceedings Series

Proceedings of a symposium jointly organized by the IAEA and FAO, Vienna, 18–22 June 1990. The technology of mutation induction has been accepted by plant breeders as a valuable additional tool for creating improved cultivars for agriculture and horticulture. It was amply demonstrated at the symposium that this technique has been applied with great success in many annual seed propagated crops such as rice, barley, wheat, cotton, soybean and pea. The technological problems identified primarily concerned vegetatively propagated crops and, in general, the logistic difficulties in identifying desirable mutants in large mutagenized populations.

Contents: (Vol. 1) Opening session; Mutation breeding in particular countries; Crop specific mutation breeding; (Vol. 2) Mutation breeding with particular objectives; Methodology of mutation breeding, Panel. Part 1: The role of plant breeding for the future of mankind and the need for genetic resources and opportunities for mutagenesis or gene engineering; Part 2: Plant mutation breeding: Its future role, the methodology needed, training and the research priorities.

STI/PUB/842 (Vol. 1. 554 pp., 51 figures; Vol. 2. 498 pp., 91 figures; 16 × 24 cm; 1991)

1: ISBN 92-0-010091-0

2: ISBN 92-0-010191-7

Price. Vol. 1: €107.56
Vol. 2: €95.93

Plant Biotechnology

INDUCED MUTATIONS AND MOLECULAR TECHNIQUES FOR CROP IMPROVEMENT Proceedings Series

(See under Mutation Plant Breeding, p. 11)

Soil Fertility and Irrigation

NUCLEAR TECHNIQUES IN SOIL-PLANT STUDIES FOR SUSTAINABLE AGRICULTURE AND ENVIRONMENTAL PRESERVATION Proceedings Series

Proceedings of a symposium jointly organized by the IAEA and FAO, Vienna, 17–21 October 1994. The objective of the symposium was to assess the progress being made in the use of nuclear and related techniques for studying various aspects of soil fertility and plant nutrition, environmental problems, the potential and limitations of existing methods, and the possibilities for further development. Analytical methods and equipment are discussed, as are isotope dilution techniques, transfers of fixed N to non-fixing crops, crop water consumption, labelled fertilizer involving fertigation, ^{13}C discrimination, erosion and soil degradation, and global warming and climate change. The proceedings should assist scientists, particularly those in developing countries, to find ways of increasing and sustaining soil fertility and crop production while preserving the environment.

Contents: Opening session; Recent developments in analytical methods and equipment; Fertilizer use and management studies; Biological nitrogen fixation in sustainable cropping systems; Soil organic matter studies and nutrient cycling; Water use and management studies; Plant physiological aspects in crop production; Environmental pollution and preservation; Soil conservation, soil erosion and desertification; Poster session.

STI/PUB/947 (735 pp., 139 figures, 16 × 24 cm, 1995)
ISBN 92-0-100895-3
Price: €154.07

**STABLE ISOTOPES IN PLANT NUTRITION,
SOIL FERTILITY AND ENVIRONMENTAL STUDIES**
Proceedings Series

Proceedings of a symposium jointly organized by the IAEA and FAO, Vienna, 1–5 October 1990. The objective of the symposium was to evaluate progress in the use of stable isotopes to examine various aspects of soil fertility and plant nutrition and some environmental problems, the potential and limitations of existing methods, and possibilities for further development. The meeting focused on the site level rather than the landscape level and, more specifically, on soil–plant relations, although landscape environmental aspects were also examined. The underlying theme was an assessment of current and possible future approaches to two problems of concern: how to increase or sustain productivity with minimum inputs, and how to limit environmental damage due to inappropriate land management and to industry.

Contents: New methodologies and approaches in stable isotope analysis; Measurement of biological nitrogen fixation using ^{15}N additions; The ^{15}N natural abundance method for measurement of biological nitrogen fixation; Review of papers in Sessions 2 and 3; Applications of ^{15}N methods to measurement of biological nitrogen fixation; Stable isotopes in soil organic matter studies; Soil nitrogen transformations and losses; Nutrient uptake and use by the plant; Stable isotopes in studies of plant metabolism; $^{13}\text{C}/^{12}\text{C}$ discrimination as a measure of water use efficiency; ^{13}C in studies of plant carbon balance; Stable isotopes in water transport studies; Sulphur flows and transformations in ecosystems; Atmospheric change and aerial pollutants.

STI/PUB/845 (670 pp., 137 figures, 16 × 24 cm; 1991)

ISBN 92-0-010391-X

Price: €130.81

Agrochemicals

**ENVIRONMENTAL BEHAVIOUR OF
CROP PROTECTION CHEMICALS**
Proceedings Series

Proceedings of a symposium on the Use of Nuclear and Related Techniques for Studying Environmental Behaviour of Crop Protection Chemicals jointly organized by the IAEA and FAO, Vienna, 15 July 1996. Use of pesticides has become an integral component of agricultural systems worldwide. Concerning the environment, information must be provided before a product is registered in order to provide assurance that it can be used without unacceptable hazard to non-target organisms. In addition, post-

registration surveillance and monitoring studies are necessary to check that the fate and environmental effects of pesticides under field conditions are consistent with predictions. Much of the data are generated using radioisotopes and other nuclear or related methods. Developing countries often have to rely on data generated elsewhere in order to assess the acceptability of a compound. The purpose of the symposium was to examine the circumstances under which extrapolation from one environment to another is valid on the basis of data generated under comparable conditions. It also considered ways in which relatively simple methods can be used to verify the field applicability of data obtained under sophisticated experimental conditions.

Contents: Opening session; Pesticides in the environment: International perspective; Pesticides in the environment: Regional and country situations; Fate and behaviour of pesticides in the terrestrial environment; Fate and behaviour of pesticides in the aquatic environment; Comparison of fate and behaviour of pesticides in different environments; Effect of pesticides on non-target species; Maximizing the use of environmental data.

STI/PUB/1003 (519 pp., 111 figures, 16 × 24 cm; 1997)

ISBN 92-0-104596-4

Price: €110.46

**GUIDELINES FOR AGRICULTURAL
COUNTERMEASURES FOLLOWING AN
ACCIDENTAL RELEASE OF RADIONUCLIDES**
Technical Reports Series No. 363

This report is a collation of information and experience gained from the Chernobyl accident in 1986, concerning the transfer of radionuclides, especially ^{137}Cs and ^{90}Sr , through food chains to humans and the ways to effectively reduce them. Accounts of measures taken in various countries following the Chernobyl accident, which at the time caused significant radioactive contamination of the environment over widely separated areas, some relatively remote from the site, are included.

Contents: Part I. Introduction; 1. Introduction; 2. General considerations; 3. Developing a strategy for agricultural countermeasures; Part II. Agricultural countermeasures: Scientific basis and practice; 4. Introduction; 5. Preventive measures to be applied before and during the arrival of radioactive fallout; 6. Countermeasures to be applied in the first few weeks after deposition; 7. Countermeasures to be applied in the medium and long term; 8. Losses of radionuclides in food by processing and culinary preparation; Part III. Organizing for response; 9. Introduction; 10. Emergency preparedness; 11. Response; 12. Public information and information for farmers; Part IV. Contamination in agriculture from past nuclear accidents; 13. Introduction; 14. Nuclear accident

requiring countermeasures only in the short term, 15. Nuclear accident requiring countermeasures in both the short and long term; Glossary.

STI/DOC/010/363 (115 pp., 1 figure, 16 × 24 cm; 1994)

ISBN 92-0-100894-5

Price €29 07

**LABORATORY TRAINING MANUAL ON THE USE
OF NUCLEAR AND ASSOCIATED TECHNIQUES
IN PESTICIDE RESIDUES**

Technical Reports Series No. 329

The present revised manual gives a concise yet comprehensive presentation of the basic principles necessary for the proper use of nuclear and associated techniques in pesticide residue analysis to obtain information on the metabolism or fate of pesticide chemicals in plants, animals, soil, water and non-target organisms.

Contents: Part I. Properties of radionuclides and radiation; Part II. Radiation detection and measurement of radioactivity; Part III. Radiation protection, Part IV. Tracer methodology; Part V. Radiation biology; Part VI. Introduction to practical work; Part VII. Laboratory exercises; Part VIII. Appendices; Part IX. Glossary.

STI/DOC/10/329 (264 pp., 40 figures, 16 × 24 cm; 1991)

ISBN 92-0-115091-1

Price €56 68

**STUDIES OF THE MAGNITUDE AND NATURE
OF PESTICIDE RESIDUES IN STORED PRODUCTS,
USING RADIOTRACER TECHNIQUES**

Panel Proceedings Series

Proceedings of a final research co-ordination meeting, Ankara, 30 May to 3 June 1988. The five year co-ordinated research programme was established in order to aid developing Member States in their efforts to utilize safely and effectively pesticide chemicals to maximize the production of grain and other stored products. The programme was designed to make safe and effective use of radiotracer techniques for studying pesticide residues in stored products. The present proceedings contain all papers presented at the meeting as well as model protocols for studying chemical residues in stored products and an appraisal of the overall programme accomplishments.

STI/PUB/822 (146 pp , 16 figures, 16 × 24 cm, 1990)
ISBN 92-0-111090-1
Price. €33.43

Animal Production and Health

DOMESTIC BUFFALO PRODUCTION IN ASIA Panel Proceedings Series

Proceedings of a final research co-ordination meeting organized by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Rockhampton, Australia, 20–24 February 1989. This publication reports the results of the second five year co-ordinated research programme to determine the constraints on buffalo production in terms of nutrition, reproduction and disease. Studies on nutrition focused on the comparative aspects of digestion of tropical forages and crop by-products, and on the effects of supplementation or treatment of fibrous feeds. In reproduction, emphasis was placed on the evaluation of methods for overcoming prolonged postpartum anoestrus and for improving overall productivity. The studies on diseases dealt with trypanosomiasis and rotavirus infection. Field oriented interdisciplinary research was stressed and many of the trials were carried out under smallholder conditions.

STI/PUB/855 (225 pp , 33 figures, 16 × 24 cm; 1990)
ISBN 92-0-111490-7
Price. €45.06

ISOTOPE AIDED STUDIES ON GOAT AND SHEEP PRODUCTION IN THE TROPICS Panel Proceedings Series

Proceedings of the final research co-ordination meeting on Improving Sheep and Goat Productivity with the Aid of Nuclear Techniques, Perth, Australia, 20–24 February 1989, reporting the results of a five year co-ordinated research programme. The main objectives of this programme were (a) to encourage research aimed at establishing the nutritional value of locally available feedstuffs and assessing strategies for supplementation, and (b) to examine the reproductive patterns of small ruminants in different environments, with particular emphasis on the seasonality of ovarian and testicular function, and the effects of nutrition and disease on reproductive efficiency.

STI/PUB/860 (210 pp , 58 figures, 16 × 24 cm; 1991)
ISBN 92-0-111091-X
Price: €42 15

**ISOTOPE AND RELATED TECHNIQUES
IN ANIMAL PRODUCTION AND HEALTH
*Proceedings Series***

Proceedings of a symposium jointly organized by the IAEA and FAO, Vienna, 15–19 April 1991. The symposium reviewed advances in nutrition and reproduction of ruminant and other herbivorous animals, as well as in new approaches to disease diagnosis and control. Consideration was given to isotope and related techniques currently employed in research, but more importantly to the application of research findings in improving the productivity of livestock reared in tropical and subtropical developing countries, e.g. of ruminant animals whose diets mainly consist of poor quality roughages. Also addressed were advances in the development of highly sensitive radioimmunoassay methods for measuring the concentrations of reproductive and other hormones. In addition, emphasis was given to developments in the use of enzyme linked immunosorbent assays, not only for diagnosis of diseases of major relevance to developing countries, but also for their applicability in monitoring the effectiveness of large scale vaccination programmes and conducting epidemiological surveys.

Contents: Animal nutrition; Animal reproduction; Animal health.

STI/PUB/876 (611 pp., 100 figures, 16 × 24 cm; 1991)
ISBN 92-0-010491-6
Price: €117 73

**LIVESTOCK REPRODUCTION
IN LATIN AMERICA
*Panel Proceedings Series***

Proceedings of a final research co-ordination meeting organized by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Bogotá, 19–23 September 1988. The general goals of this programme, which was part of the ARCAL (Arreglos Regionales Cooperativos para la Promoción de la Ciencia y la Tecnología Nucleares en América Latina) project, were to characterize and improve the reproductive management of milk, meat and fibre producing livestock maintained under the diverse environmental and management conditions prevailing in the Latin American region. In particular, the programme addressed the effi-

cacy of using radioimmunoassay methods to measure reproductive performance on the basis of breeding and production records, behaviour and clinical parameters.

Contents: Part I: Milk production systems; Part I(a). Intensive dairying systems; Part I(b). Dual purpose systems; Part II. Beef production systems; Part III: Sheep and goat production systems; Part IV: Camelids.

STI/PUB/833 (446 pp., 112 figures, 16 × 24 cm; 1990)

ISBN 92-0-111290-4

Price: €87.21

***STUDIES ON THE REPRODUCTIVE
EFFICIENCY OF CATTLE USING
RADIOIMMUNOASSAY TECHNIQUES
Panel Proceedings Series***

Proceedings of a final research co-ordination meeting, Vienna, 5–9 September 1988. The 13 individual papers presented at the meeting are included in this publication and represent a synthesis of the work carried out under the co-ordinated research programme initiated in 1982 with the aim of stimulating studies to characterize and improve the reproductive performance of indigenous cattle under the diverse environmental and management conditions prevailing in developing countries.

STI/PUB/829 (178 pp., 26 figures, 16 × 24 cm; 1990)

ISBN 92-0-111590-3

Price: €36.34

***TOWARDS LIVESTOCK DISEASE DIAGNOSIS
AND CONTROL IN THE 21st CENTURY
Proceedings Series***

Proceedings of a symposium on Diagnosis and Control of Livestock Diseases Using Nuclear and Related Techniques jointly organized by the IAEA and FAO, Vienna, 7–11 April 1997. The purpose of the symposium was to consider the application of science to livestock production as a complex of socioeconomic problems. It dealt not only with the impact of developments in serology and molecular biology, but also with questions of epidemiology, vaccines, information networks, geographical information systems and socioeconomic factors.

Contents: Opening session; Serological aspects; Molecular aspects; Ticks/vaccines/epidemiology; Monitoring/training;

Information technology/modelling; Satellites/climate; Considerations of impact; Poster presentations

STI/PUB/1023 (602 pp., 70 figures, 16 × 24 cm; 1998)

ISBN 92-0-102498-3

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