

North-South and South-South co-operation

by Peter M. Cate*

In the very early years of the Agency's Research Contract Programme contracts were awarded principally to well-equipped laboratories in the industrialized countries for work concerning radioactive waste management, radiation protection, radiobiology, and methods to be used in applying safeguards over nuclear materials. The programme expanded rapidly, however, to include an increasing number of contracts relating to the application of isotopes and radiation techniques, particularly in the fields of agriculture and medical applications in the developing countries. By the mid-1960s on-going Agency-supported projects were being carried out at institutes in more than fifty Member States.

It has been the policy of the Agency to assign the highest priority to projects oriented toward resolving problems in the developing countries, and to support projects at institutes in such countries whenever such institutes are capable of carrying out research of high quality. The average award for each contract each year is now somewhat more than US\$ 5000, and an average of some US\$ 2 million a year has been made available from the Agency's regular budget in recent years to support research in all fields. Over the life of the programme more than three-quarters of research contract funds have been awarded to institutes in developing countries.

During the mid-1960s it also became evident that the Research Contract Programme provided an excellent means to bring together scientists at institutes throughout the world to co-operate on common research problems; and the concept of Agency Co-ordinated Research Programmes was developed to provide a basis for close co-operation and co-ordination between researchers undertaking related research projects at institutes in both advanced and developing countries.

Co-ordinated programmes are developed in relation to a well-defined research theme relevant to the Agency's own programme and of high priority to at least a group of developing countries. The subject areas in which the Agency provides financial support are reviewed by its Scientific Advisory Committee and each proposed programme is reviewed by an Agency standing committee of scientists appointed specifically for this purpose. The Agency plays a strong role in defining the nature of the

work to be undertaken and in the selection of institutes participating in each programme. Such programmes normally cover a five-year period and include research teams at institutes in 12 to 14 Member States.

Regardless of the theme of the planned research, each programme has in common three major aspects:

- (a) scientists in advanced laboratories play a leading role in assisting and advising researchers in the developing countries;
- (b) research teams at institutes in the developing countries are encouraged to carry out work which will produce new research results and also serve as the basis for them to gain experience in their own fields; and
- (c) co-operation between institutes in advanced countries and developing countries, and between institutes in the developing countries, is strongly encouraged. To this end, the Agency organizes and supports research co-ordination meetings for each co-ordinated programme at appropriate intervals. During such meetings each co-operator is given the opportunity to present the results of his work. The progress of the programme toward its initial goals is reviewed carefully, and the direction of the work for the coming period is established.

Although the Agency normally does not provide financial support for institutes in advanced countries, a great many scientists and institutes in these countries offer their services to the Agency within the framework of the programme under the terms of an Agency Research Agreement, which has been developed specifically for this purpose. Under such agreements, the institute agrees to provide one report each year on work related to the programme which it supports, and participates in all exchanges of information between the participating institutes. The Chief Scientific Investigator is also invited to attend all co-ordination meetings at Agency expense, and lends expertise to the programme by giving guidance and assistance to other participating groups.

The tasks undertaken within the framework of such programmes vary greatly, as does the Agency's rôle in individual programmes. It has been the policy of the Agency not to establish a rigid pattern for the implementation of co-ordinated programmes, but rather to design the approach to each programme to suit best the specific research problem and the needs of the countries concerned.

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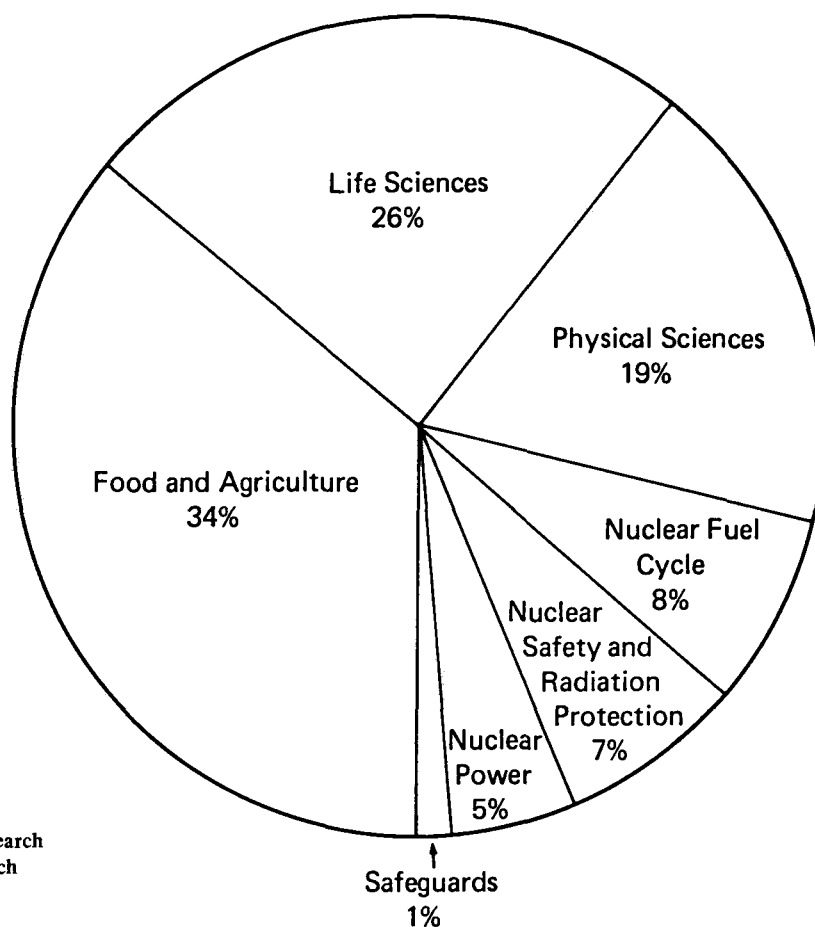


Figure 1.
Distribution of Co-ordinated Research
Programmes, by subject of research
(expressed as % of total on-going
programmes).

Current work

A current programme on isotope-aided studies on non-protein nitrogen and utilization of agro-industrial by-products by ruminants, with particular reference to developing countries, is a typical *global* programme involving eleven institutes in developing countries as far apart as Brazil and the Republic of Korea as well as lead institutes in Australia, Europe, and North America.

This programme, initiated in 1980, seeks to investigate and improve the capacity of ruminant animals to convert non-protein nitrogen and inferior feed protein to microbial protein in the rumen, and hence to increase production of milk, meat, and wool. The emphasis has been on utilization of agro-industrial by-products and wastes, and the main objectives have been to improve the nutritive value of ligno-cellulose material and to evaluate locally available by-products to be used for supplementary feeding. Specific effort has been directed toward the development of technologies for small-scale operations at the level of the individual farmer and village.

Although it was obvious from the outset of the programme that the problems of animal feeding and production were vastly different in the industrialized and the developing countries, it was recognized that substantial benefits would be derived from co-operation between the two groups of scientists. In the industrialized countries the first steps in the study of animal feeding led to the development of crude feeding systems and quickly evolved into efforts toward improvement of these systems, based primarily on the widespread use of feeds for animals which could also be used for human consumption.

In the developing countries, however, the limited availability of such resources made it imperative that efforts be directed toward the use of agro-industrial by-products and wastes that could be used as animal feed, such as molasses, oil-seed cake, by-products of the citrus fruit industry, and poultry manure.

By undertaking co-operative laboratory experiments and animal feeding trials these groups have already shown that there is considerable scope for developing the use of agro-industrial by-products and for improving the

nutritional value of readily available ligno-cellulose materials. Isotope-based research within the scope of the programme has shown that, in addition to identifying and evaluating local feeds through conventional feeding trials, it is necessary to know how to maximize microbial digestion of fibrous substrates in the rumen as well as the flow of un-degraded feed protein into the small intestine. A unique technology using standardized nylon bags to measure the solubility and degradability of all the different feeds being evaluated has been introduced by one of the lead laboratories to pursue this aspect of the research more effectively. Scientists from the lead laboratories have worked together with their counterparts, at institutes in the developing countries, to implement and standardize these experiments.

Research co-ordination meetings, sponsored by the Agency, have given the scientists involved an opportunity to discuss together the results of their respective projects, to co-ordinate the efforts of the group, and to place the future emphasis of the programme on areas which are considered to require special attention.

A very different approach has been taken in developing a programme to enhance the reliability of radioimmuno-assay of thyroid-related hormones in developing countries.

This programme is planned to give institutes in developing countries the opportunity to compare the results of their radioimmunoassays with those of other laboratories, and thereby to enable determination of the bias and variability of their results. To obtain meaningful results, close co-operation between the various laboratories is imperative, and one laboratory in each country must assume the lead rôle in providing a suite of reference serum samples.

Institutes in five developing countries have now agreed to assume the rôle of national organizing institute, to develop the "external" quality assessment scheme in co-operation with five to fifteen other laboratories in their respective countries, and to encourage and assist these laboratories to develop their own "internal" assessment schemes. It is expected that institutes in a further five countries will join the programme in the near future.

The organizing laboratories, which form the core of the co-ordinated programme, will:

- (1) prepare pools of serum reflecting normal and pathological thyroid function; and diluted or "spiked" pools, in which the relative or absolute concentration of the thyroid-related hormones are known, from which samples will be dispatched to participating laboratories for measurement;
- (2) collect the results of measurements and analyse them statistically so as to reveal the bias and variability of individual laboratories;
- (3) report their findings confidentially to the participating laboratories and, appropriately summarized, to the Agency;

(4) stimulate participating institutes to develop "internal" assessment schemes using serum pools they collect themselves; and

(5) arrange for sharing of experience among the participating laboratories.

As each of the organizing institutes will co-operate with some five to fifteen individual laboratories, it is foreseen that the programme will involve a total of one hundred or more laboratories in ten developing countries.

In addition to providing financial support to the organizing institutes, the Agency will monitor and analyse the results provided by the organizing groups, provide equipment and software needed to develop the capability to perform analyses when required, and advise both organizing and individual institutes as needed.

Co-ordination meetings, to which representatives of the organizing institutes will be invited, are planned to be held during the first and third programme years. While the success of the programme will clearly be dependent upon the co-operation of all laboratories involved, it is foreseen that the countries involved will continue the scheme following the withdrawal of the Agency after the second co-ordination meeting.

In addition to the funds made available from the Agency's regular budget for support of co-operative research efforts in developing countries, substantial sums have been provided for support of selected programmes by the Swedish Industrial Development Association, the Federal Republic of Germany, and the Governments of Australia, Italy, and Japan.

An on-going programme on optimizing grazing animal productivity in the Mediterranean and North African regions with the aid of nuclear techniques is an example of the versatility of the Agency's research contract programme in establishing a *multi-disciplinary* project, placing emphasis on a regional problem. The programme is wholly supported by the Government of Italy and involves laboratories in four industrialized countries and ten countries in the immediate region.

It was known that there were three principal inter-related impediments to producing meat, milk, and other animal by-products efficiently in the Mediterranean and North African regions: poor rates of reproduction, seasonal variation in feed supply, and differences between the local breeds of animals in their ability to adapt to environmental stresses such as low water supply. It was therefore recognized from the outset that, to be successful, this programme would have to be structured in such a way as to permit an integrated approach to the study and resolution of animal management problems. As a result, Agency experts visited the region to identify institutes and scientists capable of conducting meaningful isotope-aided *applied* research not only within, but also across the disciplines of animal reproduction,

nutrition, and environmental adaptation. Due regard was also taken of the fact that the acquisition of reliable data and the proper integration of efforts required a "critical mass" of institutes addressing each of the major areas of concern. The programme was therefore constructed around 20 institutes in 10 countries of the region, with four laboratories in industrialized countries together with Agency staff members providing advice on specific techniques, experimental protocols, and presentation of results.

This programme is also unique from the standpoint of the service it provides to those contractors who are using radioimmunoassay of progesterone to monitor the reproductive status of cattle, sheep, and goats in the region. As mentioned earlier, the reliability of hormone radioimmunoassays is critical to the acquisition of meaningful and comparable results. In this programme "quality control" assessment is provided to all contractors by one institute in a developing country in the region, supported by the Animal Production Section in the Agency's Laboratory at Seibersdorf near Vienna. Through this scheme, which involves the distribution of standard antisera and labelled hormone, and the provision of samples in which the concentration of hormone is known, both "internal" and "external" quality control are greatly enhanced. Quality control within the work in the other disciplines embodied in the programme is being attempted by encouraging the contractors involved to adhere to standardized experimental designs and techniques.

Through this rather wide approach, with its in-built quality control services, the programme is providing a multi-faceted picture of the constraints on animal production in the area. This should then serve as the basis for the introduction of well-designed managerial actions to circumvent these problems and thereby enhance livestock productivity.

Approximately 80% of the 107 co-ordinated research programmes now monitored by the Agency's scientific

staff relate to the use of isotopes and radiation techniques in the fields of Food and Agriculture, Life Sciences and the Physical Sciences, which are particularly well suited to projects of importance to the developing countries. While the remaining projects within the scope of the programmes on Radiation Protection, Nuclear Power and the Nuclear Fuel Cycle may not appear to be so strongly related to the problems of most countries of the Third World, they normally contribute substantially to the transfer of technology between the industrialized countries and the developing nations. Of the more than one thousand on-going projects within the research programme which are being carried out in 82 Member States, some four-fifths relate to co-ordinated research efforts; and practically all of the projects receiving financial support within the framework of co-ordinated programmes are being carried out at institutes in the developing countries.

One of the essential elements of all Agency research contracts is that their results are made freely available throughout the world. Each co-operator is encouraged to publish his findings in recognized scientific journals, and the Agency normally also publishes a comprehensive report of the results of co-ordinated programmes.

During the early years of the Research Contract Programme most institutes in developing countries were able to undertake projects only when financial support could be provided by the Agency. More recently, however, an ever-increasing number of institutes in these countries have also expressed their willingness to become involved in co-ordinated programmes through Research Agreements. Assuming this trend to be an indication of the interest of these Member States in forming co-operative research groups, it is evident that the Agency must continue to play its rôle as co-ordinator in the development of research programmes having a bearing on the resolution of problems in the developing countries.

