

Agricultural Education and Research.

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In recent years agricultural education has been the subject of discussion and inquiry in many countries and much reorganisation of research, teaching and advisory services has been undertaken in an effort to enhance the contribution which these services can make towards increased efficiency in agriculture and greater prosperity for the farmer. The object of this paper is to review these changes and for purposes of comparison to outline the origin, development and present position of the system in Ireland. The subject has been divided into three parts. Firstly, an attempt is made to trace the historical development of Irish research and teaching institutes and agricultural advisory services. The second part gives a brief description of systems in certain other countries which might be of interest, while finally, the present position and future outlook in Ireland is briefly discussed.

HISTORICAL DEVELOPMENT IN IRELAND.

Teaching and Research in Higher Institutes.

Facilities for systematic courses of instruction leading to a degree in agricultural science became available for the first time in Ireland in 1867, when a Faculty of Agriculture, under the direction of Professor Davy, M.D., was constituted in the old College of Science in St. Stephen's Green. The subjects for the degree examination in the third year were geology, land surveying and agricultural science. Laboratory training in the methods of analysis of soils and manures was included in the course. There was no teaching or test in practical agriculture. In the absence of any special demand at the period for graduates in agriculture, students were few.

In 1901 the newly established Department of Agriculture and Technical Instruction for Ireland took over control of the College of Science from the Department of Science and Art. From the beginning of the new régime intending students were obliged to have a thorough knowledge of farming practice. During the ensuing decade courses of instruction remained much as before. The average number of degrees granted annually in the period 1903 to 1910 was seven. With the opening of the new College of Science buildings in Merrion Street in 1911 and the provision of spacious and well-equipped laboratories, the duration of the courses in all Faculties, including Agriculture, was extended to four years. The

first and second years were devoted to the pure science subjects of Chemistry, Physics, Mathematics, Botany, Zoology and Geology. In general, these were taken in common with students of the Faculty of Science. The applied or professional subjects were taken in the third and fourth years. It will be seen later that the College of Science authorities were very much in advance of contemporary thought in two ways—their requirement that before graduation the student should qualify in an examination in practical agriculture, and their basing of the four years' agricultural science degree course on a foundation of pure science subjects. In the decade 1911-1920 the average annual number of students graduating in the Faculty of Agriculture was seven. There was now a growing demand for graduates, as the Department of Agriculture and Technical Instruction was insisting on a degree in agricultural science as a necessary qualification for county instructors in agriculture.

During this period an arrangement was made whereby the College of Science granted exemption from the basic science subjects of the course to students of University College, Dublin, and of Trinity College who had passed equivalent examinations in their respective Colleges. Such students were then admitted to the third and fourth year courses, and on passing the final examination received both the degree of A.R.C.Sc.I. and the appropriate university degree. A professor of Agriculture had been appointed in University College, Dublin, in 1918, but owing to want of funds it had not been possible to provide facilities for a systematic course in agricultural science. A somewhat similar position had existed in Trinity College, where a Faculty of Agriculture had been established in 1906. On the death of the first Professor of Agriculture in 1912 it was decided to enter into the arrangement referred to with the College of Science.

Under the University Education Act of 1926, the functions of the College of Science were transferred to University College, Dublin, together with the buildings of the Albert Agricultural College and the farm of 350 acres. It was provided that a block grant of £25,000 should be paid annually to University College, Dublin, for the purposes of the Faculty of Agriculture. In recent years an additional grant of £18,000 has been made available. In 1926 a capital grant of £7,250 was made towards the cost of extensions, new buildings and laboratories for the reorganised Faculty which was to be located at Glasnevin. The intention was that staff and students should henceforth enjoy the advantages of having a farm available as an adjunct to teaching and research. The transferred staff of the College of Science ceased to be civil servants and became Professors and Lecturers of the new Faculty. The 1926 Act provided that the demise to University College, Dublin, for a period of 99 years of the Albert College and part of the College of Science was "subject to such conditions as the Minister for Finance might think proper for securing the carrying out on the demised premises of scientific experiments and tests for the Department of State by the Officers of such Departments or the officers of the College." The Department of Agriculture had now no laboratory facilities of its own for research or investigational

work, and had no longer control of the transferred staff who had hitherto acted in the capacity of specialist advisory officers. It is understood, however, that an understanding was arrived at whereby the services of the Faculty staff, in a consultative capacity, would always be available to the State Department. Although no statutory provision was made for co-ordinating the functions of the Faculty and of the Department of Agriculture, it is believed that a small joint advisory committee was set up for this purpose. An example of co-operation is afforded by the provision recently by the State Department of a grant of £2,000 to enable an investigation on the eel-worm pest to be undertaken by members of the Faculty staff.

The academic staff of the Faculty engaged in teaching and research work in agricultural science subjects (excluding horticulture and forestry) at Glasnevin now consists of five Professors and three Lecturers. In addition there are nine assistant Lecturers in the same subjects. These latter are employed on a temporary and part-time basis, but as their average length of service amounts to about 24 years, less change takes place in the personnel of the Faculty than might be imagined. The courses of the first and second year are taken in University College, Merrion Street, and are, in general, the First Year courses in general science and biology. The third and fourth year courses taken at the Albert Agricultural College are the subjects of the Final examination for the degree of B.Agr.Sc. as follows:—Agriculture, Agricultural Bacteriology, Agricultural Chemistry, Agricultural Economics, Agricultural Engineering, Plant Breeding, Soil Science, Veterinary Hygiene, Agricultural Botany, Agricultural Zoology, Horticulture and Arboriculture, Plant Pathology and Animal Nutrition. Before entering on the courses of the third year, candidates must pass an oral examination designed to test their knowledge of practical agriculture. A similar oral test forms part of the degree examination. During the past decade the average annual number of students graduating in Agricultural Science has been twenty-six. The great majority of such graduates become either county instructors in agriculture, or are appointed to the technical staff of the Department of Agriculture, or enter the services of industrial firms dealing in agricultural products.

A Faculty of Dairy Science was established in University College, Cork, under the same Act of 1926. A capital sum of £67,000 was provided for buildings and equipment, and the annual endowment was fixed at £13,000. In recent years an additional grant of £10,000 has been made available. As in the case of the Dublin Faculty, a block grant is made to the Governing Body of the College for the purposes of the Faculty. The course is of four years' duration and leads to the degree of B.Sc. (Dairying). Practical experience of dairy farming is required from intending students. The degree courses are in a great measure designed to equip graduates for posts such as those of managers of creameries and cheese factories, or technical experts in the manufacture of milk by-products. The academic staff of the Faculty consists of 6 Professors and assistants. In addition to teaching, the staff also engage in research and investigation work. During the past decade an

average of four students qualified each year for the degree in dairy science. There is also a two-year course leading to a diploma in dairy science.

In recent years the Department of Agriculture has organised a Research Station and advisory centre for Soil Science problems at Johnstown Castle, Co. Kilkenny. For the year 1952-53 the estimated annual cost is £47,000. Many thousands of samples of soil are analysed here every year and advisory reports sent to the farmers concerned. In addition, extensive field trials are carried out on soil and fertilizing problems. There are at present 17 graduates in agricultural science or in pure science engaged on scientific work at Johnstown Castle. They are civil servants directly responsible to the Minister for Agriculture.

Agricultural Colleges and Schools.

The Albert Agricultural College opened its doors for its first session in October, 1838. Among agricultural colleges still in existence it is the oldest in these islands. A few years earlier, in 1834, the agricultural college at Uppsala in Sweden had been established. The oldest in Europe is that at Stuttgart, founded in 1817. The Glasnevin Institute, as it was called in its early days, owed its origin to a decision of the Board of National Education in Ireland, to the effect that agriculture was to be taught in the rural national schools, which at that period were being established throughout the country. For the purpose of training the national teachers in the theory and practice of agriculture, the Board purchased a house and land at Glasnevin. From the beginning, however, the College admitted also farmers' sons desiring to study the methods of improved farming. In 1849, the buildings were extended to enable 100 residential students to be accommodated. The year 1853 saw the first issue of a quarterly publication giving reports on farm operations and reviewing the general activities of the College. A perusal of the syllabus at that period may surprise those who, 100 years later, are discussing the improvement of agricultural education. Subjects taught included agricultural surveying, botany, chemistry, geology, horticulture, veterinary science and the anatomy and pathology of farm animals. In addition to class work, the student took part in the farm operations and got positive instruction in all aspects of practical agriculture. In this respect the authorities seem to have pursued an enlightened policy and to have avoided the temptation to use the students as cheap labour through devoting too much time to practical farm work. In his report for 1898, the Superintendent stressed his belief that the important work in an agricultural college is the teaching of the principles which underlie the subject.

Members of this Society may be interested in a system of small farm costings introduced by Baldwin, the Superintendent, in 1861, and continued during the ensuing 30 years. An area of 6 acres on the Glasnevin farm was marked off and treated as an entirely separate unit. Production costs, including rent and depreciation, were meticulously recorded. The net profits shown for some of the years were remarkably high. For example, a profit of £58 16s. 6d. was shown for the 8 months ending 31st December, 1870, and for

the following 12 months, as much as £108. For many years a farm of intermediate size covering 23 acres was organised in the same manner. In 1869, Baldwin read a paper to a meeting of this Society not, surprisingly, on the financial results of these model farms, but on "The Diminution of National Wealth from Cattle Diseases." The thirty years during which Baldwin was on the staff of the College appear to have been a period of intensive work and skilled direction. In addition to teaching and demonstrating, field experiments were carried out to ascertain the best methods of cultivation for flax, sugar beet, beans, tobacco, wheat, barley, oats, turnips, swedes and mangolds. A review of these experiments would be, in the words of Mr. F. P. Hussey, in the Centenary Souvenir Publication, "to tread ground that is still thought by many to be unexplored."

In the years following its incorporation into the newly-established Department of Agriculture and Technical Instruction for Ireland in 1901, the Albert Agricultural College gradually assumed a position intermediate in educational level between rural agricultural schools and the three-year course of the College of Science, which led to the degree of A.R.C.Sc.I. Many of the College of Science lecturers taught their subjects at the Albert College also. At this period, a high proportion of the resident students were farmers' sons equipping themselves with a knowledge of practical agriculture preparatory to entering the College of Science for the degree course.

The next phase in the history of the College started in 1926 when, along with the College of Science, it was transferred to University College, Dublin, and as mentioned earlier, became the centre of the reorganised Faculty of Agriculture. Under University control, it continues to provide a residential course of one year's duration for 40 to 50 students. The standard of education required for admission is somewhat higher than Intermediate Certificate standard. The fee payable is £50 per annum. Many of the students hold County Council scholarships. The course includes a considerable amount of farm work, in addition to lectures and laboratory classes in elementary agricultural science. Some of these classes are given by members of the Faculty staff. The majority of the students having obtained the diploma, either proceed to the University degree course, or obtain appointments as overseers on State rural schemes or as farm stewards.

Since the research and teaching activities of the University Faculty and the work of the residential short course are carried out in close association on the same farm and under the same direction and control, there is now a great variety of activities carried out at Glasnevin. The more important may be listed as follows:—teaching for the University degree; teaching at diploma level; research work of a fundamental nature; investigation work involving field experiments and group-feeding tests; advisory and consultative work, mostly of a specialist nature; demonstrations of modern farming techniques to students and visiting farmers; breeding of stock animals and pedigree seeds for distribution to farmers.

There are three residential agricultural schools administered by

the Department of Agriculture, situated at Clonakilty, Athenry and Ballyhaise. They were established soon after the institution of the Department in 1901 to fill an intermediate place in the system of agricultural education between the type of course given at the Albert College and the instruction given in winter night classes by the agricultural instructors. The courses are largely of a practical nature, supplemented by introductory classes in the elements of agricultural science. At the time of the establishment of these schools there was considerable misgiving on the part of the administrators as to whether a sufficient number of farmers could afford to be without the services of their sons during the entire year through which the course must obviously extend. The view was held also that attendance at such colleges would encourage young men to seek a living elsewhere than on their own farm. It was believed, however, that even without a full complement of students these schools or stations would be justified as centres for demonstration work and field experimentation, and as distributing centres for superior breeding stock. About 80 students are accommodated between all three schools each year. The fee payable by students varies from £15 to £35, depending on the valuation of the parents' farm. Scholarships are also made available by the County Councils. Nevertheless, the full accommodation of these schools is seldom availed of. The annual cost to the Exchequer of the three Department schools is about £33,000.

The Munster Institute, Cork, specialises in the training of girls in poultry science, and is also administered directly by the Department of Agriculture. This institution was opened in 1853 by the Commissioners of National Education as a residential school for boys. It was intended that it should ultimately provide courses similar to those being given at the Albert College. At that period there was a keen demand for such agricultural education, as evidenced by the enrolment by the Glasnevin Institute in 1853 of 75 students and in 1856 of 91. The hostility towards all forms of agricultural education in Ireland, shown in 1870 by the Royal Commission on Primary Education, and in subsequent years by Treasury Departmental Committees, resulted in the drastic curtailment of grants in aid of the Munster College and in a serious reduction in the number of students. The College virtually ceased to function in 1876, but with the help of prominent Munster dairy farmers and the influential butter merchants in Cork, it was re-established in 1880 under a Board of Governors, as a dairy school for girls. In 1900 it was transferred to the Department of Agriculture and Technical Instruction, and since that time has been the training centre for girls wishing to qualify for positions such as County Instructors in Poultry-Keeping and Butter-Making. The entrance examination is about Matriculation standard, and the course, which is of a specialised and applied nature, is of two years' duration. There are few facilities for teaching or instruction in the cognate pure sciences. About 14 students qualify each year and are mostly absorbed as Instructors under the County Committee of Agriculture. A sum of about £12,000 is provided annually for the Munster Institute by the Department of Agriculture.

The remaining facilities for agricultural education in residential schools are the private agricultural colleges and the Rural Domestic Economy Schools. There are four colleges run by religious orders for boys, situated at Mountbellew, Co. Galway; Warrenstown, Co. Meath; Pallaskenny, Co. Limerick, and Monaghan. More recently a mixed residential agricultural school for boys and girls has been opened under Methodist direction at Gurteen, Co. Tipperary. All these schools are State-aided, and the courses of instruction to be pursued are outlined and supervised by the Department of Agriculture. At each school practical training on the farm is given an important place in the programme. The qualifying test for entrance is, in general, of approximately intermediate certificate standard. Between all five colleges in the session 1950-51 a total of 184 boys were accommodated and, in addition, there were 7 girls in residence at Gurteen. Although many of the students enter these colleges for the purpose of acquiring sufficient knowledge of agriculture to qualify later for admission to a university degree course, nevertheless, the great majority are studying with a view to returning to the home farm and applying there the technique of better farming which they have learned. Most of the teachers of agricultural science in these colleges are university graduates. State grants to private agricultural schools amount to approximately £17,000 annually.

Finally, there are seven residential schools of Rural Domestic Economy under the control of nuns. As with the private agricultural colleges, they are State-aided, and the courses of instruction are subject to supervision by the Department of Agriculture. In addition to domestic economy subjects, the girl pupils have an opportunity of studying, during one year, improved methods of poultry-keeping and dairying. These schools were sponsored by the Department of Agriculture and Technical Instruction soon after its establishment, the first being opened at Portumna in 1904. An entrance examination is not held, but candidates for admission are expected to have sufficient general education to enable them to avail of the courses of instruction provided. Fees payable amount to about £20 per annum. About 300 pupils each year take the residential courses at the Rural Domestic Economy Schools. The estimated cost of State aid to these schools for 1952-53 is £19 000.

No account of elementary agricultural education systems in Ireland would be complete without reference to the valiant early efforts made in schools which have long since ceased to exist. Outstanding among these was the Templemoyle School, near Derry, founded by the North-West Agricultural Society in 1826. For more than a quarter of a century it was maintained out of the private funds of the Society, and judging by contemporary references, was a powerful factor in advancing agricultural knowledge in the Counties of Donegal, Derry and Tyrone. It was taken over by the National Board of Education in 1856 and ceased to exist in 1858, when State policy became unfavourable to the continued endowment of agricultural schools.

Advisory Services.

Technical advice on agricultural problems is made available to

farmers in Ireland mainly through the services of the County Instructors in Agriculture and the County Instructors in Poultry-Keeping, employed by the County Committees of Agriculture. In addition, a small number of advisory officers, responsible directly to the Minister for Agriculture, deal with matters concerned with dairying, cow-testing and the special farming problems which arise in the congested districts of the West. The graduate inspectors of the Department of Agriculture, and to an extent also, the staffs of the Faculty of Agriculture and of Dairy Science, act as specialist advisers.

The County Committees of Agriculture were established under an Act of 1899. The members are appointed by the County Council and may include people who are not members of the Council. It is mandatory on a Council to strike a minimum rate of twopence in the pound for agricultural services in the county, and they may raise the rate to a maximum of sevenpence at their discretion. In 1950-51 the average rate struck for these purposes by the 26 County Councils was just over fourpence in the pound, and the aggregate amount so collected was £156,000. The Government makes a contribution towards the cost of the agricultural services in each county equivalent to the amount raised by rates. Sanction from the Department of Agriculture must be obtained for most disbursements of the County Committees of Agriculture.

The duties of a County Instructor in Agriculture are extensive and diverse. They include the visiting of farms for the purpose of giving advice; the collection of statistics on crop yields for the county; sampling on merchants' premises under the Fertilisers and Seeds Acts; taking of soil samples for analysis; organising and teaching night classes in winter; organising and giving lectures; carrying out field and livestock experiments and demonstrations; acting as judges in competitions and at Shows; inspecting bulls and boars; rendering weekly, monthly, and annual reports on all these activities.

The 1950-51 Report of the Minister for Agriculture gives the following details concerning the work done in that year by the County Instructors. The 88 Agricultural Instructors employed made 63,252 visits to farms; organised 836 demonstration plots, 961 field experiments and 38 livestock experiments; held 127 winter classes, which were attended by 3,799 pupils, and arranged 716 lectures, at which the aggregate attendance was 19,628.

All the Agricultural Instructors are graduates in agricultural science. The salary attached to the post is £390 per annum, rising over a period of 19 years to £802 per annum, together with allowances for expenses. The total cost of the county advisory work is about £170,000 per annum, approximately half of which is paid from Central Funds. This covers services organised by the County Committees in respect of poultry, horticulture and forestry schemes, and includes salaries of about 80 Poultry Instructors and about 50 Horticultural Instructors. With one or two exceptions the latter are not graduates. The cost of the purely agricultural section of the advisory services was £67,000 in 1950-51.

The system of itinerant instruction in the counties was not long in operation before the administrators in the Department of Agri-

culture and Technical Instruction became aware of the need for a specialist advisory service with laboratory facilities at its disposal for dealing with problems beyond the capacity of the Agricultural Instructor, or with those of national rather than of local significance. Accordingly, in 1911, a grant of £5,000 per annum was obtained from the Development Fund, and staff and accommodation were secured in the College of Science and elsewhere for the development of specialised divisions as follows:—Seed Testing, Plant Diseases, Seed Propagation, Veterinary Research, Chemical, Animal Nutrition and Costings. The Great War interfered with progress, and not all of these divisions were fully developed when the College of Science ceased to exist a few years later. The Costings division, consisting of a Chief Officer and six assistants, recorded costs on 18 farms during the year 1920. Later, under the new Department of Agriculture, in 1924, accounts were kept of the working of 90 farms, including the four Department farms. This survey was carried out largely under the supervision of the County Instructors.

MODERN IDEAS AND SYSTEMS IN OTHER COUNTRIES.

In reviewing systems of agricultural education in other countries, it is to be realised that the choice of methods will, of necessity, be strongly influenced by considerations of a political or social nature. Consequently, a system even though highly successful in a particular country, may not be appropriate for adoption elsewhere, or indeed from the strictly educational aspect, might not even be the most suitable for the country concerned. It may be accepted, however, that the common aim of all systems of agricultural education, research and advisory services, is to bring to an increasing number of those working the land, a full knowledge of methods and practices through the adoption of which profitable production can be brought to a maximum.

Various considerations influenced the selection made of the foreign systems to be reviewed in this paper. The British organisation is treated at some length, not only because much of our own had similar origins, but because of the very considerable amount of thought and discussion which has been devoted to these problems in Great Britain during the past decade. The U.S. system is of interest, since one of the first objects of Marshall Aid in Ireland was to be the improvement of our agricultural research and advisory services. Brief sketches of methods in Denmark, the Netherlands and Sweden have been included, because they are relatively smaller countries and, as in the case of Ireland, agriculture is an important part of their economy. Moreover, the approach to the problem has been different in each of these three countries. The Dutch, in general, have developed along the lines of centralisation, under the Ministry of Agriculture; the Danes favour organisation as far as possible through their co-operative societies, while in Sweden much of the direction and co-ordination is achieved through semi-autonomous boards.

England and Wales.

The fact that the Luxmore committee was constituted in the year 1941, is striking testimony to the importance which was attached to the re-organisation of agricultural education. The terms of reference were: "To examine the present system of Agricultural Education in England and Wales, and to make recommendations for improving and developing it after the war." In 1944, the Loveday Commission was set up "to consider the character and extent of the need for higher agricultural education in England and Wales, and to make recommendations as to the facilities which should be provided to meet the need." The changes in the structure of agricultural education and advisory services which followed consideration of the recommendations made in these two reports, naturally gave rise to problems of administration. The examination of these was entrusted to a small committee, the findings of which, known as the Ryan Report, were published in 1951. These reports, together with the comments and discussions which they have engendered, present a fairly comprehensive picture of the existing pattern of agricultural educational services in England and Wales, and of the new orientation which it is considered desirable to give them. While there is unanimity as to the ultimate aim, not unnaturally there is a divergence of opinion as to the administrative methods to be pursued.

Throughout the latter half of the 19th century a considerable amount of agricultural research of a fundamental nature was conducted at higher institutes in Great Britain. In general, these schools of teaching and research had their origins in the enthusiasm of particular scientists in universities and similar institutions, or in the public spirit and munificence of local individuals who appreciated the need for such research work in the interests of British farming. It was in 1909 that the Government first took an active interest in the promotion of research in agricultural science. The Development and Road Improvement Fund Act of that year made moneys available for the erection and maintenance of research institutes. It is pertinent to recall that in the programme of development outlined by the Board of Agriculture in 1911, it was considered that Ireland's great need was for an Institute of Animal Breeding. A further recommendation, of interest in view of later development, was that research should be carried out in self-governing and independent institutes rather than in State-controlled ones. The next significant Government action in furtherance of agricultural research was the setting up of the Agricultural Research Council (A.R.C.) in 1931. Like the Medical Research Council, this body was founded by Royal Charter and is not, therefore, directly responsible to a Government Ministry. Its object is to promote and co-ordinate scientific research on agricultural problems. During the last war, funds were placed at the disposal of the A.R.C. to enable it to establish and staff research institutes, and to finance agricultural research in any appropriate institute. The A.R.C. at present disburses an amount of £30,000 per annum in this manner.

There are seven Universities in Great Britain with agricultural Departments. These are still autonomous, although largely financed

by the State either directly or through the A.R.C. In 1938-39 there were between all these University Faculties a total of 517 degree students, 252 diploma students and 494 students taking various short courses.

The residential agricultural colleges form the next important group of teaching institutes in Great Britain. There are seven of these, the oldest being that at Cirencester, established in 1845. Most of them provide a two-year course, of a high standard, designed for students who aim at managing their own farms or securing posts as land agents, etc. In 1938-39 there were 738 students attending these colleges. In the post-war years long waiting lists for admission are the rule. These colleges are, in general, independent foundations, although most of them are now in receipt of financial aid from the State or the county.

County farm institutes under the control of the Local Education Authorities comprise a third group of institutes in Britain concerned with both teaching and investigation work. The courses are usually of one year duration. In 1938-39 there were 821 students in residence in 17 such institutes. Until the changes of 1946, transferring the advisory services from the jurisdiction of the Local Education Authorities, farm institutes formed wherever possible the centre of organisation for these services and, in addition, were utilised for demonstrations and field experiments.

The Luxmore committee had recommended the setting up of a National Council so constituted as to be outside the Ministry of Agriculture, but under the control of the Minister, who should be answerable for it to Parliament. This body, they suggested, should be responsible for the organisation on a national scale of both the advisory services and the teaching in the farm institutes. The Government, however, decided to divorce these two services and, accordingly, while teaching was left in the hands of the Local Education Authority, the organisation of the advisory services was, as from the 1st October, 1946, centralised under a new body—the National Agricultural Advisory Service (N.A.A.S.). The service is ultimately to employ 1,750 officers, and is estimated to cost £2 million per annum. The N.A.A.S. became the direct responsibility of the Minister for Agriculture, and its entire staff, technical and administrative, are civil servants. Much discussion has since developed around these points of deviation from the Luxmore recommendations. No formal scheme has yet emerged for co-ordinating advisory work and university research work. The N.A.A.S., however, are organising specialist advisory services on a provincial basis. Other views expressed by the Luxmore committee were to the effect that universities should not offer courses leading to diplomas below degree standards; that the standards in the Faculties of Agriculture and the educational qualifications of entrants should be as high as in other Faculties of a university; every member of the teaching staff should undertake original research work; a farm should be considered an essential adjunct to a university Faculty of Agriculture.

The Loveday committee, dealing more specifically with higher agricultural education, stressed that graduation to a degree in agricultural science should be only through a course in natural

sciences equal in standard to that of the science Faculties. They were opposed to the granting of degrees in specialised branches of agriculture such as dairying and poultry science. Advisers at specialist level should, in their opinion, have done an honours pure science course before specialising in the agricultural subjects. They estimated that to provide sufficient staff for the agricultural research, teaching and advisory services, about 400 graduates would need to qualify each year. It was recommended that the grants to the university Faculties of Agriculture should be raised to a total of £150,000 per annum, equivalent to approximately £120 per student per annum.

Scotland.

The Scottish system is an example of very full integration between research, teaching and advice. The advisory services are based on and administered from three well-known agricultural colleges which, although semi-autonomous, come under the general direction of the Board of Agriculture. These colleges are in turn associated with the autonomous universities of Glasgow, Edinburgh and Aberdeen. It is to be noted that in Scotland the enforcement of Government regulations of a penal nature concerning farmers is not the responsibility of the advisory officers. The development of this unified system was made easy by the regional distribution of colleges and universities originally designed to serve the North, West and East of Scotland. So satisfied were the Scottish authorities with the proved suitability of this established system, that the Committee set up in 1945 to report on Agricultural Education in Scotland, came to the conclusion that to detach the advisory officers from the Colleges and to attach them to Government Departments, as had just been done in England, would deprive the advisory service of a proper scientific and educational basis and diminish the close association between officers and farming community. The committee further expressed the opinion that the professors and lecturers responsible for the degree courses in agricultural science should be associated in their work with their university colleagues in pure science. Another recommendation was that the research activities of universities and research institutes should be brought under unified scientific direction.

North of Ireland.

In the North of Ireland there is an even closer system of co-ordination between the branches of agricultural education, made possible, doubtless, by the small and compact area to be served. In general, the staff of the Faculty of Agriculture in Queen's University, Belfast, are civil servants, whose salaries are paid by the Government. In many cases, the holder of an office devotes part of his time to the requirements of a university appointment and part to his work as a research officer or adviser to the Ministry. Vacancies are filled through nomination by the Ministry, provided that the University senate is satisfied as to the qualifications of the nominee. The Agricultural Research Institute of Northern Ireland is situated on a farm of 500 acres at Hillsborough. New buildings

costing £46,000 were erected there in 1924. The institute is under the direction of a Board of Trustees representative of the University, the Ministry of Agriculture and farmers' organisations.

Denmark.

As is to be expected in a country where co-operation has been so highly developed, the Danish agricultural education services are extensive. There are 26 residential agricultural schools giving instruction to about 2,500 students annually. These receive financial aid from the State, but are controlled by private individuals or by co-operative societies. The Royal Veterinary and Agricultural College in Copenhagen, which is directly under the Ministry of Agriculture, is responsible for the training of graduates in Agriculture and for most of the fundamental type of agricultural research. The graduate course is of 3 years' duration and is, to a great extent, an applied course. Before entering on it, a student must produce evidence of 3 years' experience of farm work. The Ministry is responsible also for about a dozen experimental stations throughout the country. A distinctive feature of the Danish advisory service, which has been in operation since 1860, is that it is now administered almost exclusively by the co-operative societies. In 1950, out of a total of 601 advisory officers, only 11 were employed by the State. The societies are subsidised from State funds to the extent of 20 to 30 per cent. of the cost of the advisory service. In Denmark the advisory services are sectionalised, and even the general practitioner type of advisory officer restricts himself to a particular branch of agricultural science.

Netherlands.

The Dutch system is an example of unification of services through direct administration by the State. With the exception of the Faculty of Agriculture in the autonomous University of Wageningen nearly all teaching, research and advisory work is done by State Departments. There are 41 residential agricultural schools of secondary education standard, in which there were almost 4,000 pupils in 1948. In the same year, at three higher agricultural colleges, there were 800 students, while in the University of Wageningen there was a total of 1,154 students studying for degrees in agriculture, horticulture and forestry. The country has been divided into 19 administrative districts for advisory work. There are about 1,200 advisers, of whom about 200 hold university degrees. In the Netherlands much use is made of demonstrations on farms worked by the owners under the direction of the advisory officer.

Sweden.

There is an analogy between Swedish and Irish rural conditions in so far as there are about 400,000 farmers in Sweden, almost 80 per cent. of whom are small-holders owning their land.

The type of educational organisation which developed in Sweden was very much influenced by the existence of a number of old-established private institutions and societies for the promotion of agricultural science. When the State came to subsidise agricultural

education it naturally made use of these existing organisations as far as possible. Finally, an autonomous co-ordinating body—the Royal Board of Agriculture—was constituted and charged with the supervision of all teaching and advisory work. Of its seven members, four are appointed by the King, on the recommendation of the Minister for Agriculture, and the remaining three by the independent provincial societies, who actually organise the teaching and advisory services. The total advisory staff number between 700 and 800, of whom just less than 200 are graduates.

Teaching at university level is provided at the Ultuna Agricultural College, founded in 1849 in association with the ancient University of Uppsala. The degree of B.Sc.(Agr.) may be obtained in general agriculture or in specialised branches such as Animal Husbandry. Research in agricultural science is carried out at the newly-endowed Ultuna Institute and at several provincial centres. The Agricultural College and the Institute, and some of the provincial research centres are now under Government control and direction. Further research work is sponsored by co-operative societies and private firms. There are about 60 residential agricultural colleges or schools in Sweden in which, during 1946-47, accommodation was provided for 2,456 students.

United States.

As early as the beginning of the 19th century, many private agricultural societies flourished in the agricultural areas of the Eastern States. Their constant demands for State help led to the establishment of the U.S. Department of Agriculture in 1862. The first State College of Agriculture had already been started in Michigan in 1855. To-day there are 48 State Colleges of Agriculture, all of which are considered to be at university level. In 1887 legislation was enacted to enable the Colleges to develop Experiment Stations to facilitate agricultural research and teaching. The first County Agricultural Agents were appointed in 1906, and from the beginning the extension services which they organised operated as departments of the College. This complete integration of teaching, research and advisory work is considered in the United States to be of paramount importance. The O.E.E.C. report on Agricultural Extension Services in the U.S.A. describes the advantages of the system thus:—"The results of research are channelled to the farmer as rapidly as possible; the farmers' problems and difficulties are continuously under revision by the research staff; and the teaching of the University in Agriculture is oriented with a view to emphasis being placed on current developments and its professional staff being kept in step with the nations' requirements." Practically the entire personnel of the advisory services have graduated after a four years' degree course. The funds for the agricultural services are derived partly from Federal and partly from State sources. The president of a State College of Agriculture is responsible both to his Board and to the U.S. Department of Agriculture for his conduct of the advisory services. The enforcement of statutory regulations concerning agriculture is not a responsibility of the advisory service.

CONSIDERATIONS INFLUENCING THE TREND OF DEVELOPMENT IN IRELAND.

To have reviewed the origins and development of Irish agricultural education, and to have given a summarised account of the trend of thought and of the practices which characterise development in other countries, is to invite discussion and speculation on the changes which the future may bring in Ireland.

It will have been evident that behind all the recommendations and opinions which have been cited, there is a striking measure of agreement on fundamental aims and ultimate objectives. Making full allowance for the inevitable wide differences in method and approach, it may be concluded that there would be a substantial measure of agreement on the following five points as representing the salient features which the ideal system of organisation in any country would possess :—

1. Higher agricultural education and research would be organised in university institutes, with staff and students enjoying full association with other Faculties.

2. Since the training of agricultural students at university level tends to get more and more specialised, the degree courses to an increasing extent would be based on pure science. Nevertheless, a wide knowledge of practical agriculture would be a pre-requisite for a degree in agricultural science.

3. The functions of the different agricultural institutions would be limited and clearly defined.

4. Advisory services would be staffed by graduates in agricultural science. A specialist as well as a general advisory service would be provided.

5. There would be unified direction and the fullest possible integration of teaching, research and advisory services—not necessarily under centralised control or State administration.

It is worth recalling in how many of these respects Irish administrators of the past, as already recorded, have done pioneer work. Thus, from the earliest days of county itinerant instruction in agriculture, only graduates have been employed. The degree course in agricultural science has always been to a considerable extent based on the appropriate pure science subjects. Degrees in agricultural science have been granted only to students possessing a sound knowledge of practical agriculture. Finally, at one period in the past, a specialist advisory service was in process of development in the College of Science.

It will have been noticed that there appears to be complete unanimity on the desirability of having courses of degree standard in agricultural science given only in university Faculties. The greatest safeguard against a lowering of standards for graduates in agriculture is to have the Faculty of Agriculture part of a larger university system in which the professors of pure science subjects are active members of the agricultural Faculty. Moreover, since

graduates in agriculture, through their later appointments, occupy influential positions in the community, the advantage of a university atmosphere during training would appear to be very great. It has been observed that in some countries where the teaching of agricultural science is carried out in isolated colleges the standard of the basic scientific training suffers as a result of over-emphasis on the applied agricultural subject in a crowded curriculum. The favourable comments which have been so frequently made by visiting educationists on the extent of the fundamental knowledge shown by many of the county instructors in Ireland, is testimony to the advantages of our system of training the future instructors in university institutions. In this respect also it may be claimed that the system inaugurated in Ireland in 1901 was well in advance of contemporary practice.

The ever-increasing specialisation in agricultural science has created a problem for teaching institutions everywhere. It has been seen that the five or six subjects of the final Faculty of Agriculture examination in the old College of Science are now represented by no less than 13 subjects. The dilemma facing so many university authorities is that with an increasing number of subjects in the degree courses in applied science, the standard for the individual subjects eventually falls below accepted university standards. No doubt, the ultimate solution will be along the lines of giving more fundamental degree courses in more restricted groups of subjects.

The British commissions of inquiry attached considerable importance to the recommendations that agricultural colleges and schools should be graded into two main categories—the one-year Farm Institute course and the two-year advanced college course—and that, moreover, none of these courses should be given in a university institution. Most countries also find somewhat similar divisions advisable. In Ireland an analogous system is found in the difference between the type of course given at the Department of Agriculture schools or the private agricultural colleges, and the one-year course, of higher standard, which the Albert Agricultural College is capable of providing. The want of interest in these courses and the absence of any demand on the part of the farming community for increased facilities for residential college training in agriculture is a disappointing feature of Irish agricultural life. It has been shown that on any basis of comparison the attendances at such colleges in other countries are proportionately many times greater than the corresponding figures for Ireland. In view of the long waiting list in recent years for admission to such courses elsewhere, one would have expected the demand here to be such that the Albert Agricultural College would again need to accommodate one hundred students, and to utilise the farms and buildings at Glasnevin for the sole purpose of providing an advanced one-year course in the scientific principles underlying good husbandry. An instructive observation which has been made elsewhere in connection with agricultural college education is that a minimum of one hundred students each year is required to justify the salaries of first-rate teachers and the cost of providing modern laboratory facilities.

It seems clear from the reviews given of different systems that in all countries the advisory services are considered to occupy a pivotal position in the structure of agricultural education services. They not only form the channel through which the results of research and investigation are brought to the farmer, but they are the only effective means of communication through which the research worker and the teacher can get an understanding of the farmers' problems. Hence, it was that O.E.E.C. selected this part of the system of organisation for special study by their visiting teams to European countries. In every country visited they recommended that the advisory services be strengthened. In Ireland, while impressed by the training and knowledge of the graduate county instructors, the O.E.E.C. team considered the number employed to be very inadequate, as evidenced by the ratio of one instructor to approximately 4,000 farmers. They observed that this led to a sense of futility on the part of some instructors. They concluded, moreover, that agricultural instructors were overworked, and inadequately remunerated as compared with other professional classes in the Public Service. The O.E.E.C. team commented very favourably on the proposed Parish Plan, describing it as a most forward step in the improvement of agricultural advisory work in Europe. Briefly, the Parish Plan proposed to provide one advisory agent to every three Parishes, or a ratio of one to every 800 to 1,000 farmers. The advisory agents were to be employed directly by the Ministry of Agriculture, and any county wishing to participate would be expected to transfer its existing advisory service and personnel to the control of the Minister. The real advance inherent in the Parish Plan scheme was the reduction in the extent of the area to be served by one officer and in the provision of office facilities. It may be remarked that if these advantages were to be accorded to County Committees of Agriculture, the existing system might give the improved results anticipated without transferring the service to Ministerial control.

There is no doubt that the most urgent and at the same time the most difficult problem to be solved in Ireland, as in so many other countries, is the elaboration of a method for the effective integration of the teaching, research and advisory services. The O.E.E.C. Survey Team in Ireland, in referring to this subject, suggested that "these three branches should be welded together in a much more unified organisation than now exists." It has been shown that the best examples of co-ordination in this respect are the Scottish and the U.S. systems. Both these countries, however, enjoyed the advantage of a favourable regional distribution of universities and agricultural colleges, and when the time came to develop the advisory services they were naturally based on these colleges. In England there would appear to be two schools of thought—one believing that closer integration is best achieved by bringing more of the agricultural services under the direct control of the Ministry, and the other advocating co-ordination through general direction by a semi-autonomous body such as the Agricultural Research Council.

It has been observed in England that harmonious co-operation between specialist and local advisory officers, even though they are not under the same control, has been fostered by the fact that very

often the advisory officer had been trained at the same university or higher research institute where the specialist whom he later consults is engaged. Such a consideration would have even greater force in Ireland, since all county instructors in agriculture graduate from the Faculty of Agriculture in Dublin. It is quite possible, therefore, that a specialist advisory service organised on a subject basis, the personnel of which would be the staff of the Faculty, might under Irish conditions form the ideal link between the ordinary advisory service and the teaching and research work of the university Faculty.

Discussion of the larger problem of co-ordinating the work of all the agricultural, educational and research services in Ireland would lead into the realm of speculation. It must suffice, in conclusion, to restate the elements of the problem as presented in this paper. Briefly, they are that agricultural research of a fundamental nature and also teaching at the highest level are best carried out as an integral part of a university system; that the necessary specialist advisory service should be identified with such research and teaching; that, on the other hand, teaching in agricultural colleges and schools, field experimentation and the administration of the general advisory service are not appropriate activities for a university department. Does it point to the creation of a semi-autonomous co-ordinating and controlling body, representative of all interests involved and charged with the duty of disbursing the moneys voted each year for the agricultural teaching, research and advisory services? Whatever form the solution may take, let us hope that by blending our fine traditions from the past with all that is best in contemporary thought, it may give to the Irish farmer an agricultural education service as good as any in the world.

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SUMMARY.

The President, in summing up, said that Dr. Senior had made a convincing case for the integration of teaching, research and advisory services at the University level. Both Universities could and should play an essential part in such integration. The School of Agriculture in T.C.D. was a small school, but it had existed for nearly 50 years, and some of our graduates were playing a prominent and useful part in modern scientific agriculture in many districts in Ireland.

Even more important was the integration of agricultural with general education at the primary and especially at the secondary school level. In this connection it should be remembered that the Glasnevin Model Farm was originally acquired by the Board of National Education in 1838, and maintained by it till the end of the century, when it was taken over by the new Department of Agriculture. The Board maintained it, not only as a Model Farm, but as a place of residence for future National School teachers in training. Until 1875 there were numerous Model Schools, with farms attached, in which primary education was combined with practical agricultural education. In 1857 there were 160 such schools, widely scattered throughout the 32 counties, and nearly 3,000 pupils were in attendance at them as boarders or day pupils. A short-sighted decision of the Treasury in 1875 compelled the Board to abandon this valuable feature of its system, but agriculture was still regularly taught in National Schools so long as the Board controlled the Glasnevin Model Farm. The Swiss Committee commented favourably on this feature of its policy and recommended its development. Unfortunately, under the new regime at Glasnevin, this vital link was broken and agricultural education was replaced by agricultural instruction with unsatisfactory results.

Under modern conditions it would be undesirable to combine agricultural with primary education. The matter is discussed more fully in Chapter II of my book, *Irish Agriculture in Transition*. But, as there indicated, there are good reasons why a much larger proportion of our youth should receive a secondary education, and, in the numerous cases where secondary boarding schools have farms attached, why these should be used as an invaluable educational instrument for combining practical with theoretical instruction in the sciences that are basic to agriculture. A farm is nature's laboratory, and every pupil attending such a school should have the educational advantage of contact with the school farm, whether he is destined for agricultural pursuit or not.

Under present conditions it is possible for the sons of large farmers and others to pass through some of our more fashionable schools, with farms attached, without having ever heard of the significance of protein in the ration or the function of clover in a pasture.