

The South-Eastern Agricultural College and Public Support for Technical Education, 1894-1914*

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Abstract

During the agricultural depression of the late nineteenth century several Acts of Parliament, and the fortuitous 'whiskey money', laid the foundations for a new policy towards technical education. The South-Eastern Agricultural College (1894) was an example of this policy in action, for it represented an attempt to bridge the traditional chasm between practical and theoretical agriculture by means of public funding. Its staff quickly produced textbooks and research publications which summarized and promoted agricultural science, and the London University BSc in agriculture (1902) created a precedent by demanding the same standards as other natural science subjects. The new institution justified its support by placing a high proportion of its students in responsible posts in the agricultural industry and in teaching, and its reputation helped to establish the principle that only on the basis of state support could there be an effective national system of agricultural education and research.

IN HIS inaugural lecture as Sibthorpian Professor of Rural Economy at Oxford, given in February 1895, Robert Warrington felt keenly the responsibility of his position. 'Seldom', he said,

have circumstances been so adverse to the prosperity of the agricultural community as they are at present. The extremely low prices which have prevailed for many years . . . have brought both the tenant and landlord in many cases to the verge of bankruptcy.¹

This was no exaggeration. The price of wheat, for example, had fallen in 1894 to little more than one-third the level that was typical twenty years before. Indeed, the severe agricultural depression of the 'nineties was worse even than that of the previous decade, and prices were to show but little recovery by the beginning of the Great War.² The harsh realities of free trade had opened the home markets first to the importation of cheap North American grain, and then to an ever accelerating barrage of meat and dairy products from the Americas and Australasia. British farmers – especially those on the drier grain

lands of the east and south – suffered a devastation from which recovery could be salvaged only by radical adaptation. Many, however, exhibiting not for the first time 'traditional' inflexibility and conservatism, were forced off the land either to seek in industry the menial wages which cheap and abundant food could justify, or to chance their luck as pioneers in the New World. The ones who survived, at first to eke out a living during what for the more fortunate among the expanding urban population and their political masters was a period of peace and plenty were, in substantial measure, those who accepted the new situation and determined to utilize the cheap grain as a basic commodity for producing the eggs, milk and meat that were by now in increasing demand.

The several government inquiries of the period did little except document the extent of the depression. Direct state aid for agriculture was still widely regarded as unthinkable, although by the time of Warrington's appointment at Oxford, a beginning had at least been made in the name of technical and scientific education. This beginning, however, was largely fortuitous, for it sprang from the government's entirely separate policy of 1890 to reduce the number of liquor

* I am grateful to Professor Maurice Crosland of the University of Kent at Canterbury, and to two anonymous referees for helpful advice. The work was supported by a grant from the Royal Society for research in the history of science.

¹ R Warrington, *On the Present Relations of Agricultural Art and Natural Science*, 1985, p. 3.

² R E Prothero (Lord Ernle), *English Farming Past and Present*, 1912, p. 441.

licences and to impose an additional tax on beer and spirits with the view of paying reasonable compensation to the holders. But the idea of recompense raised such sanctimonious hostility that the scheme had to be hastily abandoned. The result was that the government now had an annual income of more than £700,000 (the Residue Grant, known almost universally as the 'whiskey money') for which no purpose existed. A H Acland,³ general secretary of the National Association for the Promotion of Technical and Secondary Education (founded in 1887), advocated its allocation to the county councils for technical instruction and this, being an uncontroversial even though a surprising suggestion, was duly accepted by a 'lethargic and half-empty House'.⁴

What was so remarkable about the phenomenon of the 'whiskey money' was that the shock of its accidental emergence seemed at last to break down government resistance to public enterprise, such that it represented more than did any prefabricated strategy the official recognition of the principle of state aid for technical instruction; the result was that every county council in England eventually became involved in educational administration. Once begun, developments were relatively rapid reaching, for agriculture, a first climax in 1894 when several events gave promise of recovery even at the very nadir of the depression and when apathy and cynical opposition seemed to be pervasively entrenched.

The most general of these events was perhaps the formation of the Agricultural

Education Association, which held its first meeting at Cambridge in June, with A E Brooke-Hunt from the Board of Agriculture as guiding spirit and chairman, and D A Gilchrist of the University Extension College, Reading, as secretary.⁵ The Association's objective was the encouragement of all branches of agricultural education and research by the mutual assistance and advice of its members, all of whom were, or had been, engaged in teaching, and who currently represented major institutions connected with agriculture. The chief significance of Brooke-Hunt's initiative was, of course, that it gave to the small band of seven pioneer educationists a direct, respectful and sympathetic ear at a time when the Board of Agriculture was, as Charles Crowther has put it, 'content to referee our game and leave us free . . . to formulate the rules'.⁶

More specific events of 1894 (in addition to the appointment of a new Sibthorpe Professor after an interval of four years) included the first examination for the diploma in agriculture at Cambridge. Significantly in the present context, this covered a host of science subjects, but made no provision for agriculture itself, the more applied 'bread studies' being still regarded with the utmost suspicion.⁷ The diploma represented, however, formal recognition of the past efforts of the Cambridge and Counties Agricultural Education Committee as well as the first step towards a future School of Agriculture (1899) of great

³ Arthur Herbert Dyke Acland, 1847-1926 (son of Sir Thomas Dyke Acland), educational reformer and Liberal MP for Rotherham, was the individual largely responsible for reorganising the Science and Art Department and abolishing payment-by-results.

⁴ See P R Sharp, 'Whiskey money and the development of technical and secondary education in the 1890s', *Journal of Educational Administration and History*, 4, 1971, pp 31-6; and H E Dale, *Daniel Hall. Pioneer in Scientific Agriculture*, 1956, p 29. For the political background to this fund see P R Sharp, 'The entry of county councils into English educational administration, 1889', *Jnl Ed Admin and Hist*, 1, 1968, pp. 14-22.

⁵ Arthur Ernest Brooke-Hunt was a Cambridge graduate and had also studied at the Royal Agricultural College, Cirencester. The Minute Books and other papers of the Agricultural Education Association are held at the Library of the University of Reading. Its activities from 1894 to 1915 are detailed in MS 123/1/1 and 2. I am grateful to Mr M Bott for giving me access to the material in his care.

⁶ C Crowther, 'Agricultural education and the work of the Agricultural Education Association, 1894-1994', *Agricultural Progress*, 19, 1944, pp 37-41 (p 38). See also C Tyler, 'The history of the Agricultural Education Association, 1894-1914', *Agric Prog*, 48, 1973, pp 1-9.

⁷ See R Ede, 'The School of Agriculture, University of Cambridge', *Agric Prog*, 15, 1938, pp 137-42; and F L Engledow, 'Agricultural teaching at Cambridge, 1894-1955', *Memorandum of the Cambridge University School of Agriculture*, 28, 1956, p 5.

distinction. Then there was the effective establishment, under Gilchrist, of the agricultural department at Reading and the issue of its first diploma with the validation of the Oxford Delegacy for Local Examinations.⁸ Finally, 29 November saw the arrival of thirteen students at the small Kentish town of Wye for the opening of the South-Eastern Agricultural College, 'the first and only college founded and maintained by public money solely for the benefit of agriculture in England', and 'the only institution in this country comparable, in its scope and equipment, with the national agricultural schools of France, the Lehr-Anstalten of Germany, or the State colleges in America'.⁹

It is the purpose of this paper to investigate the character and influence of this new institution as a particularly successful example of how higher agricultural education came to be established in England at this time despite – or perhaps because of – the deep depression, and only in consequence of the emerging policy of public enterprise.

I

But before we examine the particular case of the 'South-Eastern', it will be as well to recall rather more of the developments of the previous decade which had made possible the events of 1894. Against the sombre background of the depression and the vast but divided literature that discussed it, it was at first extremely difficult to generate enthusiasm for the idea – and it was this idea which was crucial – that technical education might be a necessary,

if still perhaps not a sufficient remedy.¹⁰ In 1887, the *Report of the Departmental Committee on Agricultural and Dairy Schools*, under Sir Richard Paget, had recommended the provision and maintenance by the state of a Central Normal School for Agriculture (to be built, it said, near Rugby), although in the counties agricultural schools should be established by 'local effort . . . [being merely] . . . stimulated and assisted' by government aid.¹¹ The proposed School would not compete with such established private institutions as the Royal Agricultural College at Cirencester or the Downton Agricultural College near Salisbury (for which the government might provide exhibitions of £80–100 per annum), because its predominant purpose would be the training of much-needed teachers. In this connection the Committee noted the poor record of the existing 'long course' (three years) at the Normal School of Science in South Kensington, an average of only seven students per year having graduated in the principles of agriculture since 1878. While these few individuals certainly had a comprehensive training in science, their knowledge of practical farming remained hopelessly inadequate.

In the years immediately following publication of the Paget Report, there passed through parliament four Acts which were to have a profound effect upon the teaching of agricultural science. Before this time the backwardness of rural education (and secondary education generally) was largely guaranteed by the absence of any organizing machinery. Therefore the establishment, first by the Local Government Act of 1888 of a publicly-elected local authority

⁸ See D A Gilchrist, 'The agricultural department of the University Extension College, Reading', *The Record of Secondary and Technical Education*, 3, 1894, pp 514–25; and H A D Neville, 'The University of Reading', *Agric Prog*, 22, 1947, pp 67–75.

⁹ A D Hall, quoted in *Kentish Gazette*, 18 July 1896, on the occasion of the visit to the College by the Duke of Devonshire; and *idem*, 'A plea for higher agricultural education', *Rec Sec and Tech Ed*, 3, 1894, pp 256–60 (p 259).

¹⁰ The Royal Commission of 1882, by emphasising the poor seasons of the late 1870s, perhaps delayed remedial action, while that of 1893 took a complacent view which broadly approved the status quo. There was little unanimity of opinion within the agricultural community itself, one of its major sources of weakness. For an interesting critique see E A Attwood, 'The origins of state support for British agriculture', *Manchester School*, 31, 1963, pp 129–48.

¹¹ *Report of the Departmental Committee on Agricultural and Dairy Schools*, 1887, *Parliamentary Papers (PP)*, 1888, XXXII, 6.

for every county area, and then, after a good deal of wrangling, by the Technical Instruction Act of 1889 of provision for technical education by means of a penny rate, undoubtedly marked the opening of a new era in agricultural education, for it was specifically named in the Act as proper to be aided.¹²

Also in 1889 there was at last created by the Board of Agriculture Act a department of state which could represent the interests of agriculture at cabinet level. Prosperity, it said, must be brought back to the farmers, 'not by any action of Parliament, not by the fostering care of a Department, but by bringing home to them that knowledge and power by which they themselves may work out their own deliverance'.¹³ One of the tasks of the new Board was thus to develop agricultural education, and a modest grant of £5000 per annum was made available for the whole country. The first institution of higher education to benefit from this fund (by £200) was the University College of North Wales at Bangor, a development of some significance since it represented the initiation of what soon became the Board's overt policy, that of integrating agriculture within the existing framework of university education throughout the country, the more elementary forms of instruction being left to the fledgeling local authorities.

Because the local authorities were in most cases slow to use the rates as a means of raising funds for technical instruction, and because the Board of Agriculture grant was still so limited, little progress might have been made had it not been for the financial windfall represented by the 'whiskey money' (Local Taxation (Customs and Excise) Act of 1890). The restrained tippling which had commenced with the

Technical Instruction Act was now transformed into a minor orgy of intoxication. Even though no obligation was placed on the councils to use the funds for educational purposes – and some applied them to reduction of the rates – the 'whiskey money' grants were greater than any other public contribution to technical education throughout the 1890s. In every year, for example, they exceeded the total expenditure of the Department of Science and Art (only part of whose funds was in any case directed to science and art classes).¹⁴

Unfortunately, because virtually all initiative was left to the local authorities, there were major differences between the educational achievements of the various areas. While the total 'whiskey money' applied to agricultural instruction was of the order of £80-90,000 per year – spent on local lectures, itinerant instruction, dairy schools and so on, as well as on grants to new or existing agricultural colleges – some counties spent nothing, others as much as £15,000. Paradoxically, it seems that the counties prominent in agriculture generally spent least, for the task of soliciting support for scientific education was there the most difficult.¹⁵ Although the Education Act of 1902 (which significantly improved the arrangements for secondary education and hence provided a sounder basis for technical instruction) finally ended the tendency of some counties to direct the 'whiskey money' to rate relief, the inequitable system of dividing the grant persisted well into the twentieth century.

But the 'whiskey money' undoubtedly proved to be the major stimulant behind the developments which followed. One of the first actions of the Board of Agriculture was to veto the suggestion of the Paget Committee concerning the establishment

¹² The prolonged efforts necessary to secure the Technical Instruction Act on the Statute book have been described by Sharp, 'The entry of county councils', *loc cit*.

¹³ Mr W H Smith, in moving the Second Reading of the Bill. Quoted in F L C Floud, *The Ministry of Agriculture and Fisheries*, 1927, pp 13-14.

¹⁴ Sharp, 'Whiskey money', *loc cit*, pp 31 and 35. According to A D Hall, state support specifically for agricultural education rose from £5000 in 1899 to £12,300 in 1908-09 and £35,500 (including £17,000 to local authorities) in 1913-14. See 'Agricultural education in England and Wales', *JRASE*, 83, 1922, pp 15-34 (p17).

¹⁵ See Floud, *op cit*, p 91.

of one state-aided Central Normal School, even though this had also been recommended by a joint committee of the Farmers' Club and the Central Chamber of Agriculture.¹⁶ It is surprising that separate groups of agriculturists should have differed radically on so fundamental a point of policy, but in the event it seems that the Board finally acceded to the view expressed by the Education Committee of the long-influential Royal Agricultural Society of England. In their Report of 1890, the Committee argued that:

From the varied nature of English agriculture, a single establishment would be of comparatively little use, and there would probably be a narrowness in the spirit of its teaching which would render it undesirable. We must rather look forward to the movement that is now taking place at the higher seats of education in this country . . . which will provide more varied centres of instruction, with the adjuncts of almost every branch of scientific teaching in immediate propinquity.¹⁷

II

For the present moment it is sufficient to say that in the four years to 1894, agricultural departments had indeed been developed at the university centres of Aberystwyth, Bangor, Cambridge, Leeds, Newcastle, Nottingham and Reading, while in 1900 the six-year-old South-Eastern Agricultural College was to become, by a special arrangement, the School of Agriculture of London University within its Faculty of Science, enjoying all 'such privileges as it would have had if situated within the administrative county of London'.¹⁸ This association was unusual – almost unique – for the College was sixty miles from its adoptive parent and had

therefore been obliged, from the moment of its independent reincarnation, to provide all the necessary staff and facilities on its own site; there could thus be no dependence upon other departments to provide 'service' teaching. As a result the College exhibited in microcosm many of the controversies and paradoxes which have always beset the world of higher agricultural education. At one and the same time it was rural in location and had all the trappings of the more traditional, and more practically-orientated, 'agricultural college', yet the remarkable men who ran it during the first few critical years were scientists in the best academic sense, and at least at the start, there was not a trained agriculturist among them.

The success of the College is a salutary story which shows how much could be achieved by able men, at last given the financial wherewithal, and cooperating in their dedication to an idea whose time (they believed against all apparent odds) had come. There can have been few periods during which the traditional opposition of British farmers towards formal education was stronger than in the 1890s, the great majority holding a thoroughly jaundiced view of agricultural science as a result of what they perceived to be the close links by now forged with unprofitable farming practice by the labours of Lawes, Gilbert and their colleagues at the Rothamsted Experimental Station in Hertfordshire. Only a small sanguine minority argued that it might conceivably be the very failure to transmit this new science (which was not infrequently opposed to established custom) to the farmers that explained the poverty of their farms.¹⁹ Even the Duke of Devonshire, a redoubtable propagandist for applied science, then President of the

¹⁶ See A H H Matthews, *Fifty Years of Agricultural Politics, Being a History of the Central Chamber of Agriculture, 1865-1915*, 1915, pp 318-23.

¹⁷ 'Report on Technical Education in Agriculture', *JRASE*, Third Series, 1, 1890, pp 851-4 (p 853).

¹⁸ *The University of London Act, 1898*, pp 1898, 1, 586. See also N Harte, *The University of London 1836-1986. An Illustrated History*, 1986, pp 166-67. For the full text of the Statutes, see *The University of London: The Historical Record*, (first issue), 1912.

¹⁹ For example, George Bayliss of Berkshire, who applied the basic lessons of the Rothamsted experiments and successfully grew corn without livestock (for manure). See C S Orwin and E H Whetham, *History of British Agriculture, 1846-1914*, Newton Abbot, 1971, p 277.

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National Association for the Promotion of Secondary and Technical Education and Chancellor of Cambridge University, speaking at Wye of his own belief in the future of scientific agriculture, confessed that if confronted with the question, 'Why don't you try it for yourself?' would have found it 'almost unanswerable'²⁰

At the College there was also a complete break with tradition, not in the emphasis on science in the curriculum, but in the high scientific calibre of the staff, which provided 'a distinctive character, enabling it to achieve results quite impossible under the old scheme in which teachers were nominally agriculturalists who had acquired some knowledge of science'.²¹ Yet this emphasis was of just the kind which Daniel Hall, the first Principal, must have known would antagonize many individuals on the county councils that were to finance his institution under the terms of the Technical Instruction Act. Indeed, East and West Sussex withdrew from the proposed scheme before it could take final shape (establishing a more modest school of agriculture and horticulture at Uckfield), leaving only Kent, a famous, if unusual, agricultural county, and Surrey, already becoming (sub)urbanized. But there were not only bitter opponents in the counties; even among the first College Governors were some who thought it an impertinence to force a technical education upon farmer's sons, Hall himself quoting one as saying, 'What we want is a place from which we can get a really good ploughman or shepherd'. Of two possible farms available to the College, the sceptical Governors pointedly chose the one notorious for its poverty and with the ominous name of 'Coldharbour', expressing the view that 'if the Professors can make that pay they will really have something to teach us'. At first

they even retained control of the farm themselves and employed to run it their own bailiff, who was not a member of the College staff. The professors were to 'teach [and] the Farm Committee would demonstrate the practice';²² surely as classic an instance as any of the chasm which still yawned between practical and theoretical agriculture.²³

The location of the College was to be around the nucleus of an old foundation originally built in 1447 by Cardinal Archbishop John Kemp as a College of Secular Clergy, where twelve priests were to pray for the souls of his parents and to educate the children of his home town in the art of grammar. The buildings of the College of St Gregory and St Martin were now modified and extended at the County Councils' expense to include lecture rooms, laboratories and student accommodation. The Councils also released as the original staff the men who for two or three years had been serving as Extension Lecturers.²⁴ It was an unorthodox method of recruitment but one that was to serve the new institution exceptionally well.

The individual to whom we probably owe the first conception of the College was Hugh Macan, a leading figure in the national movement for technical education and secretary of this committee for Surrey. He envisaged an institution of university rank which would provide for the south-eastern counties facilities comparable to those, for instance, of the Yorkshire College, Leeds, the College of Science in

²⁰ A D Hall, 'The South-Eastern Agricultural College, Wye, Kent', *Agric Prog*, 16, 1939, pp 1-7 (pp 5 and 2-3).

²¹ For an investigation of this theme during earlier periods, see S Richards, ' "Masters of Arts and Bachelors of Barley": The struggle for agricultural education in mid-nineteenth century Britain', *History of Education*, 12, 1983, pp 161-75; and *idem*, 'Agricultural science in higher education: problems of identity in Britain's first chair of agriculture, Edinburgh 1790-c1831', *Ag Hist Rev*, 33, 1985, pp 59-65.

²² For an account of this aspect of the work (which reached a peak during 1891-92) made possible by the Technical Instruction Act, see S Marriot, 'The whiskey money and the University Extension Movement: "golden opportunity" or "artificial stimulus"?', *Jn' Ed Admin and Hist*, 15, 1983, pp 7-15.

²⁰ The 8th Duke (Spencer Compton Cavendish) visited the College during its second year. See *Kentish Gazette*, 18 July 1896.

²¹ E J Russell, 'Alfred Daniel Hall, 1864-1942', *Obituary Notices of Fellows of the Royal Society*, 4, 1942, pp 229-30 (p 233).

Newcastle, or the Hartley Institute at Southampton.²⁵ At Oxford Macan had been a contemporary of Daniel Hall (and, as it happened, of M J R Dunstan, who was to be the second Principal) in the Chemistry School, and he now worked closely with E J Halsey, Chairman of the Surrey County Council and a city financier. Halsey had grown to know and respect Hall during the latter's years as Extension Lecturer, and as first Chairman of the College Governing Body he was doubtless influenced by him in agreeing its strong scientific representation. Among the original Governors, for example, were the distinguished chemist and popularizer of science and technical education, Sir Henry E Roscoe, MP (who had played an active part in establishing the Technical Instruction Act of 1889 and who became Vice-Chancellor of London University in 1896), the professor of chemistry from Cambridge, George Downing Liveing, and the eminent botanist Harry Marshall Ward from the Royal Indian Engineering College.

Yet it was clear from the beginning that the College would have to justify itself by the efficient use of public funds. Macan argued that its financial advantages would include the more effective use of monies already spent on peripatetic lecturers and their classes, the status necessary to claim a share of the Treasury's grant to university colleges, and the ability of its dairying and research departments to qualify for support by the Board of Agriculture. Overall, he estimated that the buildings and farm could be rendered suitable at an initial outlay of £7000, while total running costs (including salaries) would be about £4700, this figure representing no more than 10 per cent of the four counties' combined technical education grant (or still less than 13 per cent of those of Kent and Surrey alone).²⁶

²⁵ See H Macan, 'Agricultural college for the counties of Kent, Surrey and Sussex', *Rec Tech Sec Ed*, 3, 1892, pp 291-99.

²⁶ *Ibid.*

As to the staff, there was no doubt that Alfredy Daniel Hall himself combined remarkable qualities of personality, ability and vision and, in the words of Sir E John Russell, 'had the further advantage of being ready for [his] work just when it was ready to be done.'²⁷ At Manchester Grammar School he had been strongly encouraged in science, and as a Brackenbury Scholar at Balliol College, Oxford – during a golden period of that institution's history – he blossomed under the tutorship of the chemist Harold Baily Dixon. In 1884 Hall obtained a first class degree in chemistry, and might then have been lost in anonymity had he not, after a few years of school teaching, joined the University Extension movement.

At the South-Eastern College he was joined by Herbert Henry Cousins as lecturer in chemistry (Hall was officially professor of chemistry as well as Principal), also an Oxford man (Merton) with a first class degree, who had subsequently studied in Heidelberg before returning to Oxford as demonstrator. As professor of botany there was John Percival, 'a heaven-born teacher and an incomparable field naturalist'²⁸ from St John's College, Cambridge, where he had succeeded brilliantly in the Natural Sciences Tripos in 1887-88, worked for a few years at the British Museum and then, like Cousins, returned to his *alma mater* as junior demonstrator. The College lecturer in zoology and economic entomology was Frederic Vincent Theobald, also from St John's, Cambridge (though five years younger than Percival). Finally – though not at the outset – Hall himself appointed Frank Braybrook Smith from Downing College, Cambridge to rectify the omission of a teacher of practical agriculture. Smith was a farmer's son and, it seems, of a diplomatic nature, for he showed the greatest respect for his colleagues' science and yet proved himself a most

²⁷ Russell, *loc cit*, p 229.

²⁸ Hall, *loc cit*, p 3.

capable agriculturist. Accordingly, the management of the farm was quickly transferred to his hand and in 1895 he himself was made Vice-Principal.

What is striking about these men is that each was an individual of high calibre, breaking fresh ground, and soon to establish a considerable reputation; their career achievements, both at College and elsewhere, tell us a good deal about how it was that so improbable an undertaking could flourish at so unlikely a time. The four scientists quickly began to produce research papers²⁹ and – probably of greater importance at this stage – a clutch of textbooks of which it can safely be claimed that they summarized and systematized the agricultural science of the day. Based in most cases on their College lecture courses, and written against the perspective of their advisory work for farmers, they remained in successive editions the definitive texts in Britain for the next twenty years. As early as 1895, Cousins had exploited his fluency in German by translating E T Wolff's *Landwirtschaftliche Fütterungslehre* (first edition, 1861) under the title *Farm Foods*, and three years later he brought out his compact *Chemistry of the Garden* as one of Macmillan's well known 'Primer' series. This proved highly popular at the time, even though in retrospect it seems to present a somewhat naive advocacy of artificial fertilizers as against traditional farmyard manure, and must often have failed in its recommendations. But, after several corrected editions were reprinted, it was more fully revised in 1916 and again

in 1920 and 1924.³⁰ Cousins was, however, the first of the pioneers to leave Wye when, in 1900, he became agricultural analyst and later Director of Agriculture for the government of Jamaica, establishing thereby the first of the College's numerous imperial connections. During his subsequent career he published numerous papers on agricultural chemistry and tropical agriculture. Cousins was replaced at the College by Edward John Russell, a young chemist educated at the University College of Wales, Aberystwyth and at Owen's College, Manchester, whose professor (Hall's former tutor H B Dixon) had advised him that there was no career to be made in agriculture and that in any case good men did not go to agricultural colleges.³¹ After some important research on soil oxidation and the activity of micro-organisms, Russell eventually moved in 1907 to the Rothamsted Experimental Station at Harpenden, where he made a great contribution to agriculture as Director from 1912 to 1943 and wrote many of the books for which he is so justly famous.³²

Theobald, a man of private means and the only founding member of the College staff to remain for his entire career, nevertheless established a reputation as one of the country's leading economic biologists. In 1899 he published his *Textbook of Agricultural Zoology* which, though it drew on the earlier work of John Curtis and Eleanor Ormrod, was a success in its own right,

²⁹ The Royal Society Catalogue of Scientific Papers, 1884-1900, lists a total of ten publications by Cousins, Hall, Percival and Theobald, as well as four by Albert Howard and six by E J Russell (see below). With the partial exception of one paper by Cousins in the *Gardener's Chronicle*, none of these appeared in specifically agricultural journals, such as that of the Royal Agricultural Society of England. The *Journal of Agricultural Science* (in which Hall had a major hand) was not begun until 1905.

³⁰ E J Russell, in his invaluable book, *A History of Agricultural Science in Great Britain, 1620-1954*, 1966, says (p 218) that Cousins also translated O Kellner's *Grundzüge der Fütterungslehre*. He seems to have been mistaken in this, confusing Cousins with William Goodwin (also a lecturer and research chemist at Wye) who made the authorized translation as *The Scientific Feeding of Animals*, in 1909. Also see Russell, p 285.

³¹ E J Russell, *The Land Called Me*, 1956, p 93. Russell provides some entertaining anecdotal detail on the early days of the College.

³² His first, *Lessons on Soil*, 1911, represented the substance of classes he gave at the village school in Wye. His College lecturers formed the framework of his enormously successful *Soil Conditions and Plant Growth* (1912) and were more directly developed in book form by M A Fayers in *Air, Water and the Chemistry of Plant Life*, 1928.

passing through six editions from Blackwood's. From 1900 for three years he was in charge of the Economic Zoology Section of the British Museum and during the decade wrote many technical monographs and reports on mosquitoes, aphids and other pests, including a long series in his institution's own *Journal of the South-Eastern Agricultural College*.

The textbook by Percival, *Agricultural Botany: Theoretical and Practical* of 1900 was a massive and original work of the greatest importance. Illustrated throughout by the author's own drawings, it was quite intentionally written in response to the growth of centres of agricultural education. Although prepared with a high degree of scientific authority, it never lost touch with the needs of the agriculturist, constantly stressing the necessity for practical work by a series of simple exercises and experiments to be performed by the student in illustration of the facts and principles explained. The book was translated into several languages and went through four English editions in its first decade, the final (eighth) one appearing in 1936. In 1903, however, Percival moved to Reading as professor of agricultural botany and Director of the department of agriculture, and there produced another important volume, his textbook of *Agricultural Bacteriology* in 1910. He was succeeded at Wye by a second St John's man, Albert Howard, who had achieved First Class Honours in the Natural Science Tripos in 1898 before working as a mycologist and agricultural lecturer to the Imperial Department of Agriculture in the West Indies. Howard remained at Wye for only two years, but had remarkable success in India from 1905 to 1931, first as Imperial Economic Botanist and then as Director of the Institute of Plant Industry at Indore, where he did most of his work in 'organic' agriculture. He wrote many research papers as well as books, perhaps his best known being *An Agricultural Testament* published in 1940.

We have already seen that Smith's influence on the South-Eastern College was early rewarded by his appointment as Vice-Principal, and it must have posed a severe test for the new institution when both he and Hall departed in 1902. Smith's contribution was, in its way, quite as original as that of his scientific colleagues, for it was he who insisted that efficient agricultural practice was more than the mere pursuit of a dogmatic routine established by long experience; 'good' farming, he implied, was farming that paid its way and, according to Hall, Smith's attempt to analyse the costs of the various farming operations was, in a very real sense, a foundation stone for the systematic study of agricultural economics.³³ Certainly, by the time he left (for a post in South Africa where he served as Secretary of Agriculture for the Union from 1910 to 1920 before returning to Cambridge as reader in estate management till 1928) the London University BSc incorporated a detailed syllabus³⁴ which was taken up and developed by Charles Stuart Orwin, one of the earliest students at the College who returned as lecturer in farm management and book-keeping in 1903 and went on to a most distinguished career as Director of the Institute for Agricultural Economics at Oxford (1913-45).

Principal Hall left Wye upon his appointment to the directorship at Rothamsted following the death of Sir Joseph Gilbert. Probably the most influential agricultural scientist and administrator of his day, Hall's contributions to the research and popular literature were legion, whilst his series of eloquent and highly successful textbooks (*inter alia*, *The Soil*, 1903, based essentially on his lectures at Wye; *The Book of the Rothamsted Experiments*, 1905;

³³ Hall, *loc cit*, p. 4. See also his article 'Agricultural education and the farmer's son', *Journal of the Farmers' Club*, March 1907, pp. 559-76 (p. 564).

³⁴ See *London University Calendars*, 1901-02, Vol II, pp. 352-3 and 1903-04, p. 319.

Fertilizers and Manures, 1909; the comprehensive *Feeding of Crops and Stock*, 1911; *A Report on the Agriculture and Soils of Kent, Surrey and Sussex*, 1911, with E J Russell; and *A Pilgrimage of British Farming*, 1910-13) established for him an unassailable reputation as one of the greatest of all our agricultural writers.

Hall was followed as Principal by Malcolm James Rowley Dunstan, a contemporary at Oxford (Merton) who was already accustomed to pioneer educational ventures, having been Director of the Midland Agricultural and Dairy Institute in Nottinghamshire since 1896. He remained at Wye for twenty years before finishing his career as Principal of the Royal Agricultural College, Cirencester (and professor of agriculture at Bristol University) until 1927.

III

By Hall's own admission the scientific emphasis of the College's curriculum was at first overdone. It conformed to the conventional wisdom of the day (with the important addition that it was taught by highly qualified research scientists and consequently took on an even greater significance), namely, that technical education should be based almost exclusively on the principles of pure science. Although the primary objective of the College was officially to 'provide a thorough education in Agriculture and the Sciences applied to it, together with practical training upon the College Farm, for young men [of at least sixteen years] who intend to become occupiers of land, either as owners, tenants or agents',³⁵ it is clear that the presumption was in reality that the student would acquire the major part of his agriculture by subsequent experience, i.e. after leaving the College itself. Over the two years necessary for completion of the diploma

TABLE I
Synopsis of the Course for the Pass Diploma
of the South-Eastern Agricultural College
(1899-1900)

First Year	Hours	Second Year	Hours
*Chemistry	216	*Chemistry, organic and agricultural	252
*Botany	144	*Agricultural botany	180
*Agriculture	252	*Agriculture	252
Mechanics and Physics	144	*Land surveying	144
Surveying	72	Building construction	72
Zoology	72	Veterinary anatomy and medicine	144
Geology	72	Estate management	108
Engineering and machine drawing	144	Book keeping	36
Building construction	36	Geology	36
Book keeping	72	Entomology	36
*Dairying, poultry, fruit, farriery, carpentry	144	*Dairying, poultry, fruit, farriery, carpentry	144
		Forestry	36
Total	1368		1440

* Includes practical and field work, about one-third of the time indicated.

there was a total of 2808 'contact hours', representing more than 42 for each week in residence (Table 1)³⁶. An optional third year (for the diploma with honours) was available for those seeking specialization, and students could also be prepared for the examinations of the Royal Agricultural Society of England, the Surveyors' Institution, and for the Agricultural Diploma of Cambridge University. In fact during the first few years tuition was designed in particular with the prestigious diploma of

³⁵ *Journal of the South-Eastern Agricultural College*, 1, 1895, pp 3-4.

³⁶ *Board of Agriculture Annual Report on the Distribution of Grants...* for 1899-1900, PP, 1900, LXVIII, 19. See also early copies of the College Prospectus. I have examined in particular those for 1896, 1905 and 1914.

the 'Royal' (established in 1869) in mind, but Hall was severely critical of this, arguing that it forced students to acquire 'parcels of miscellaneous knowledge in which they can be examined, forgetting or unaware that the essence of education consists in learning how to use your tools . . .'. When his first scholar, Alexander Holm (later Director of Agriculture for Kenya) achieved honours in biology and carried off the Society's Gold Medal, 'the College retired from further competition, confident that its own diploma would in future be an adequate voucher for the training of its holder'.³⁷

Includes practical and field work, about one-third of the time indicated.

Work for the diploma continued long after the South Eastern College became one of the first constituent institutions of the new federal University of London, under the University of London Act of 1898.³⁸ A BSc in agriculture was instituted in 1902 for which students had first to matriculate and then pass the university intermediate examination in science, generally in chemistry, botany, zoology and geology (which could be studied at any college of the university recognized for such subjects). The final examination, after a further two years, was then taken in agriculture itself, in agricultural botany and agricultural chemistry, with evidence of

attendance at two other courses selected from agricultural engineering, entomology or law, bacteriology, forestry, surveying or veterinary anatomy and medicine. The first stipulation was particularly important for it reflected the view that the status of agricultural science in the academic world could be enhanced only by demanding the same standards as for other natural science subjects. In this respect the policy of the University was entirely new, setting a precedent which Cambridge was to follow with conspicuous success some six years later.³⁹ Even when it was eventually argued that the intermediate syllabus needed to be given a definite agricultural bias, it was not suggested that agriculture itself should be a subject for examination, 'the standard of which in pure science it [was] not proposed for one moment to lower'.⁴⁰

It is not clear, however, that the success at Wye was the result of this emphasis on science. Certainly the research papers and the authoritative textbooks could have been produced only in an atmosphere where original investigation and systematic scientific instruction were valued, yet the College had still to walk the notorious tightrope between theory and practice. No matter how high its reputation for agriculturally relevant science, it had still to persuade practising farmers that it was worthwhile to part not only with their sons just when they were contributing usefully on the farm, but also with £40-70

³⁷ Hall, *loc cit*, p. 4.

³⁸ The original distinction between ordinary and honours diplomas became in due course that between the College certificate (2 years) and diploma (3 years), but Membership of the College was attained only by means of the latter or by the London BSc degree. The 1914 Prospectus lists 154 Members (15 by degree), and of these 38 had also obtained the Professional Association of the Surveyors' Institution, 15 the National Diploma in Agriculture (ratified jointly since 1900 by the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland), and three each the National Diploma in Dairying, the Fellowship of the Surveyors' Institution and the Cambridge University Diploma in Agriculture. Incidentally, Hall was no more enthusiastic about the National Diploma, saying that it 'sins against every canon of good examining... [and]... is the most serious hindrance to the progress of agricultural education our colleges are faced with today'. See 'Agricultural education and the farmer's son', *Journal of the Farmers' Club*, March 1907, pp. 559-75 (p. 565). With these sentiments Dunstan evidently agreed (p. 572).

³⁹ The questions of syllabus and academic standards were delegated to a committee (consisting of Hall, Major P G Craigie of the Board of Agriculture, Dr B Dyer, the agricultural chemist and a London University graduate, and a Professor J B Farmer of the Royal College of Science) by the Board of Studies in Agriculture at its first meeting on 1 February 1901, and their proposals discussed at subsequent meetings. See the Attendance and Minute Book, Board of Studies in Agriculture, University of London Library, Archives of the Central Office, AC8/3/1/1. I am grateful to Mr S Bailey for granting me access. The policy of emphasizing common standards in science was not pioneered at Cambridge as is sometimes believed. Under W Somerville and T H Middleton emphasis was strongly 'agricultural' - even to the extent of providing special courses (of modest quality) in science. It was T B Wood who strengthened the science base in 1907. See Ede & Engledow, *loc cit*.

⁴⁰ Evidence by J M R Dunstan to the *Royal Commission on University Education in London*, Third Report, PP, 1911, XX, 517.

per annum in the shape of fees. The rural location of Wye ensured that the College would always be seen by its county sponsors primarily as an institution for teaching practical agriculture rather than as part of a university's Science Faculty, and this image must have been fostered by its ancillary ('extension') objectives. These included the provision of peripatetic tuition in agricultural subjects around the counties, with formal lectures and the operation of so-called migratory vans which offered instruction in dairying, farriery, poultry and bee keeping; the establishment of chemical testing and seed control laboratories for local farmers; the conduct of field experiments and demonstrations at various locations; and the organization of short courses of instruction in special subjects, including those for teachers in elementary schools. We have seen that E J Russell was involved directly in work at the Wye village school, and so had Hall been before him, giving 'nature study' a solid foundation and always confirming, with the children themselves, that the courses for teachers were sufficiently practicable.

Hall was undoubtedly a master communicator, at one with an audience of children just as he was at a scientific meeting, and during his time at Wye he scored a notable victory in the ceaseless struggle to foster and maintain good relations with the farming community. While his College was being refurbished, he had approached the influential Canterbury Farmers' Club (founded in 1793) with a request that he might address them on the subject of what the new institution hoped to achieve. He was not welcome. Nevertheless, before he left Wye he had become not only a member of the Club but its honoured Chairman, the larger farmers being now 'entirely on the side of the College', seeking 'the sciences that are taught inside' even more than the practical tuition on the farm. According to the testimony of one such individual (given to the Reay Committee

of 1908 - see below) the College had proved to be 'most satisfactory'; he did not know of one among his colleagues who regretted having sent his son there.⁴¹

The growing trust of the farmers was reassuringly reflected in the rising number of students at the College. The original thirteen had almost trebled by 1896, reached 46 by 1900, 71 by 1909 and 124 by 1913. Corresponding figures at other publicly-funded centres of higher agricultural education, for example Aberdeen, Bangor, Durham (Armstrong College, Newcastle) and Cambridge were eight at the first three in 1900 and fifteen at Cambridge, then 10, 13, 17 and 52 respectively for 1909, and in 1913, 27, 18, 31 and 152.⁴² During this same period, incidentally, the three private institutions were struggling desperately to survive. Thus student numbers fell at Cirencester from 104 in 1885 to 70 in 1906, and support from the Board of Agriculture was urgently sought after 1909.⁴³ The colleges at Downton and Aspatria (in Cumberland) were forced to close in 1906 and 1914 respectively.

This success at Wye was not achieved without some serious heartache over the financial problems of the first three years. The two County Councils were to establish and maintain the College in the proportion of 3:2 for Kent and Surrey, and together they had supplied more than £25,000 (from a combined technical education grant of about £37,000) before it was one year old. The Board of Agriculture also played a supporting role, giving

⁴¹ See Dale, *op cit*, p 48; and *Report of the Departmental Committee Appointed to Inquire into the Subject of Agricultural Education in England and Wales. Evidence and Index*, PP, 1908, XXI, 1492, 899 and 924.

⁴² Figures derived from Dale, *ibid*, p 43; *Board of Agriculture Annual Report*, *loc cit*; *Board of Agriculture and Fisheries Report on the Distribution of Grants...*, PP, 1910, VII, 561; and *Board of Agriculture and Fisheries Annual Report*, PP, 1914, XI, 717.

⁴³ See G H J Watkins, 'The Royal Agricultural College, Cirencester. Its origins and development as a specialist institute of scientific learning, 1844-1915', unpublished MEd thesis, University of Bristol, 1979, especially pp 87-93 and 99-100. A copy is held at the College; for access to it I am grateful to the Librarian, Mrs F Huckle.

annual grants which rose from £150 in 1895-96 to £1000 in 1899-1900 – the largest for any such institution.⁴⁴ But debts quickly accumulated, not least because many of the students, being residents in the counties, paid reduced fees, and it was estimated that by March 1897 the deficit would reach £8000. Drastic action was needed, and it was speedily taken. The major debts were paid off by the Councils, but the College grant was reduced by £1000 per annum and the staff entered upon one summer vacation without their salaries! Henceforward, the reduced income was somehow made to suffice; in any event, within two years full recovery had been achieved and funds could once again be borrowed to finance the urgently-needed expansion.⁴⁵ In its Report of 1897, the Royal Commission on Agricultural Depression concluded that of all the institutions founded by County Councils for agricultural instruction:

Wye College [sic] . . . is the most important . . . Colleges situated in towns, and devoting only a portion of their energies to agricultural teaching, cannot be expected to compete successfully except perhaps in the comparative cheapness of . . . the education they offer. Time will determine which of the two systems is the fittest [sic] to survive, but as long as they continue to co-exist, they should supplant, and not clash with or overlap, each other.⁴⁶

As it happened, both systems were to survive although, with the partial exception of the Midland Institute (which became the detached department of agriculture of the University College of Nottingham after the First War) the pattern at

Wye was not repeated elsewhere. At the time of its foundation, there was no clear distinction between the two sorts of students with which it had to cope, those intending to enter farming itself, and those who aimed to be public officers in teaching or administrative posts at home or overseas. The nature of the course, far from ideal for either, was rather better suited to the second category, but when Hall conducted an enquiry in 1899-1900 he found nevertheless that of seventy-five students who had passed through the College, some thirty-five had taken up farming. A second investigation in 1904-05 evidently confirmed that most students gained good 'agricultural' positions, and published figures for 1911-12 indicate that about 61 per cent intended to enter into farming (despite the fact that no more than 22 per cent came from agricultural families) and 28 per cent into teaching (presumably of some aspect of agricultural science). The comparable (combined) percentages for four multi-departmental centres with agricultural interests (Aberdeen, Bangor, Durham and Leeds) were 59 (53) and 32, and those for the private Royal Agricultural College 96 (82) and 4.⁴⁷ It thus appears that in terms of the students it attracted and of its influence on the agricultural industry, the College (despite impressions and prejudices to the contrary) quickly established itself as essentially a 'university' institution rather than as a mere 'agricultural college'. It was in this way that the broad role for publicly-supported higher agricultural education was clearly established and the position of the College within it quite unambiguously declared. As Sir E John Russell was later to say, the College 'became one of the chief teaching centres for agriculture in Great Britain and its pupils have long held

⁴⁴ See Dale, *loc cit.*, p. 46.

⁴⁵ Dale, *ibid.*, pp. 44-5; Hall *loc cit.*, pp. 5-6; and the volume 'Day by Day' in the Wye College archive. It should not be forgotten that the Kent County Council at this time was already involved in the support of a similar institution, the Swanley Horticultural College, which had been founded in 1889 (and amalgamated with the South Eastern College in 1945, after suffering severe bomb damage during the war). See E Morrow, 'Swanley Horticultural College, 1889-1945', Wye College, 1984 (typescript, 102pp).

⁴⁶ *Royal Commission on Agricultural Depression, Final Report*, 1897, PP, 1897, XV, 154. Note that the College was not officially given its present name until, in 1948, it was incorporated into London University by royal charter.

⁴⁷ See E J Lewis, 'The South-Eastern Agricultural College and the sons of the tenant farmer', *Journal of the Agricola Club*, 1, 1902, pp. 12-14 (p. 12); Russell, *loc cit.*, p. 234; and Board of Agriculture and Fisheries and Board of Education, *Fifth Report of the Rural Education Conference*, PP 1912-13, XI, 143.

high positions in many parts of the world'.⁴⁸

IV

Five years after the founding of the College, the Departments of Education and of Science and Art were amalgamated in the Board of Education. The original idea had been for the transfer of the existing educational powers of the Board of Agriculture to the new Board, although as it happened there developed a good deal of rivalry, no action was taken, and both Boards continued to make grants in support of agricultural education.⁴⁹ To prevent overlapping it was eventually agreed that the Board of Agriculture should support higher education and 'institutions of special character' (for example the Royal Veterinary College in London and the British Dairy Institute at Reading), while the Board of Education would support elementary agricultural schools and technical colleges.⁵⁰ But in 1912, in the wake of the Development and Road Improvement Fund Act of 1909 (see below), it was eventually decided to transfer the Board of Education's grants to the Board of Agriculture.⁵¹ The latter then created the so-called Rural Education Conference. This, with the invaluable cooperation of the Royal Agricultural Society of England and the Agricultural Education Association, considered all questions relating to education in country areas and issued a number of reports which set out their findings.

The work of the Rural Education Conference was made a great deal easier by its having access to the exhaustive *Report of the Departmental Committee on Agricultural*

Education in England and Wales which, under the chairmanship of Lord Reay, had been published in 1908.⁵² The Reay Committee was a strong one. Its comprehensive review – the first since the enquiries of H M Jenkins (1884)⁵³ and Paget (1887) – reflected the progress of two decades, and its recommendations laid the foundations of official policy for the next thirty years.

Despite this progress, the national position still could not compare with the network of state-supported institutions in many other countries, for example the Danish folk schools, the German research stations, and the American land grant colleges. When the Committee sat, the Board of Agriculture supported six universities and university colleges in England and Wales (its role for Scotland having ceased in 1896 when the administration of grants was transferred to the Scottish Education Department), namely Aberystwyth, Bangor, Cambridge, Durham, Leeds and Reading. Oxford University was in the process of establishing an agricultural department but as yet received no grant, and the Universities of Birmingham and Manchester, and the University College at Bristol, had interests in applied science that it was thought might be developed in the direction of agriculture. In addition there were a number of agricultural colleges receiving grants from the Board. These included the South Eastern College (still treated as such despite its being already a School of London University), and the College of Agriculture and Horticulture at Holmes Chapel in Cheshire, the Midland Agricultural and Dairy Institute at Kingston, Nottinghamshire, and the Harper Adams Agricultural College at Newport, Shropshire, all three of which prepared a

⁴⁸ Russell, *op cit*, p 226.

⁴⁹ See L A Selby-Bigge, *The Board of Education*, 1927, pp 14 and 24.

⁵⁰ Board of Education Memorandum, PP, 1908, LXXXI¹, 927. Also Memorandum of Arrangement between the Board of Agriculture and Fisheries and the Board of Education, PP, 1909, LXVII, 15.

⁵¹ Memorandum of Revised Arrangement between the Boards, PP, 1912-13, LXV, 335.

⁵² *Report of the Departmental Committee on Agricultural Education in England and Wales*, PP, 1908, XXI, 363; *Evidence and Index*, PP, 1908, XXI, 417.

⁵³ *Royal Commission on Technical Instruction, Second Report* (Vol. II), 1884, PP, 1884, XXX, 1; and *Report of the Departmental Committee on Agricultural and Dairy Schools*, 1887, PP, 1888, XXXII, 6.

minority of students for the London external BSc.

Beginning with the premise that 'agricultural education is of such vital importance to the United Kingdom that no effort should be spared in making provisions for it as full and complete as possible',⁵⁴ the Reay Committee found that the institutions for higher instruction were, broadly speaking, sufficient in number. It therefore recommended that in future increased expenditure be aimed at improving the quality of their staff and facilities. In particular, it was stated, teachers of such subjects as agricultural chemistry and botany should have high qualifications, and an especially progressive opinion was that 'teachers of agricultural science should attempt to combine investigation with teaching' and that in the higher institutions 'original work should not only be encouraged, but expected'.⁵⁵ There were also innumerable suggestions relating to what the Committee identified as a thoroughly unorganized and inadequate system of lower agricultural instruction, the most notable being the proposal for some fifty or sixty farm institutes, which should not be left solely to the local authorities but funded in part by the Board.

The opportunity for implementing these recommendations came in 1910 when Lloyd George introduced the new Liberal Government's Bill to establish the Development Fund. The idea of the Fund was substantially without precedent in British political history. It sought to reverse the protracted rural depression by means of an enormously increased investment in the scientific development of agriculture, forestry and fisheries. A sum of almost £3m was raised and entrusted to eight Commissioners, including Daniel Hall who, in 1912 resigned his post at Rothamsted when the dual responsibilities became too heavy.

Three aspects of their work were of particular relevance in the present connection. First, some £325,000 were set aside for the development of Reay's farm institutes (compared to a total grant of £12,300 in 1909-10 from the Board of Agriculture for all agricultural education and research) and schemes for six of these were approved before the outbreak of the Great War; associated with these institutes were the county advisers who were to represent the link between farmers and the teaching establishments. Second, the Fund provided for the creation of a network of agricultural research stations, each (on Hall's advice) with its own speciality and each devoted to the idea of a fundamentally scientific approach to agricultural problems; in this plan we see the emergence both of the profession of agricultural research in this country and of systematic cooperation between science and farming.⁵⁶ Third, there was instituted a system of scholarships (of £200 for each of three years) whereby graduates in a pure science – usually botany, chemistry or zoology – were enabled to undertake original research in any of the subjects covered by the experimental stations. Of forty-seven scholars elected between 1911 and 1914, all but three were, by 1930, still engaged in the service of agriculture as teachers, research workers or technical advisers, and they included several men of considerable eminence, such as A W Ashby, the agricultural economist, F L Engledow, who became the Drapers' Professor of Agriculture at Cambridge, and J Hammond, the reproductive physiologist.⁵⁷

It was characteristic of Hall that his commitment to agricultural chemistry was not the myopic obsession of lesser men. In his evidence to the Reay Committee he had argued that the farmer could be convinced of the value of the new scientific

⁵⁴ *Report of the Departmental Committee on Agricultural Education*, op cit, p 38.

⁵⁵ *Ibid*, p 26.

⁵⁶ See Floud, *loc cit*, p 94; and Russell, *loc cit*, pp 268-72.

⁵⁷ See A D Hall, 'The research scholarship scheme', *Journal of the Ministry of Agriculture*, 37, 1930, pp 213-18.

knowledge only if it could be shown to increase his profits as well as his production. The traditional double-entry bookkeeping taught to agricultural students at the time was of scarcely any use as a guide to improved farm management because it could not separate the relative profitabilities of the several productive activities found on the typical mixed farm.⁵⁸ He had been hard at work developing an improved system and in 1902 wrote to his old Wye colleague F B Smith with news of his success.⁵⁹ Although his particular method of full costings was soon to prove too unwieldy for general application, it was Hall's interest in the role of accounting in farm management that led him, as Development Commissioner, to recommend establishment of the Institute for Research in Agricultural Economics at Oxford in 1913. As we have already seen, the first Director of the Institute was C S Orwin, who had also been the first student interviewed by Hall for the South Eastern College.⁶⁰ In this development the former Principal must have gained a special satisfaction, for superimposed on the the solid scientific reputation of his College there was now the fulfilment of his own and Smith's conviction that new farming methods must, in the nature of the agricultural enterprise, be seen to pay their way. Agricultural economics, therefore, was as worthy of state support as natural science.

At last the idea was accepted that only on the basis of sufficient state support

could there be an effective national system of education and research. Any remaining reluctance in this respect on the part of government or in agricultural circles (and reluctance there still was, despite the principle's widespread application in other sectors of the economy) was shortly to be swept away by the alarming circumstances induced by the Great War, for by 1914 food production had declined to only one-third of the country's needs.⁶¹ In the face of grave emergency, it was soon shown what central organization of productive activities could achieve despite a critical shortage of farm workers; it suggested, moreover, what undreamt-of standards it might attain in time of peace. The search for labour-saving machinery, the establishment of minimum standards of cultivation, the 'scientific' control of weeds and pests, and the acceptance of the likely need for import regulations – all dependent upon education in the shape of scientific and economic expertise – were carried over into the post-war period in the form of new attitudes and new legislation. Only through the medium of substantial and sustained public support had institutions such as the South-Eastern College been enabled to arise and thrive during the depression, and only through the services that they offered could agriculture regain the health and economic importance of half a century before.

⁵⁸ *Report of the Departmental Committee...*, *loc cit*, p 56.

⁵⁹ See Dale, *op cit*, p 61.

⁶⁰ Hall, 'The South-Eastern Agricultural College', *loc cit*, p 5.

⁶¹ For a detailed account of the changes introduced, see T H Middleton, *Food Production in War (Economic and Social History of the World War)*, general editor, J T Shotwell, Oxford, 1923.