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## PRESIDENTIAL ADDRESS

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### Agricultural education in New Zealand

R.D. ANDERSON

Members of the Society will be well aware of the rapid re-structuring process currently in progress in the rural sector of New Zealand. This restructuring is destined to generate economic and political circumstances for that sector which will be radically different from those of the past. Members will also be aware that, whereas many recent commentaries have dealt at length on current problems and deficiencies of the sector, and the directions which ought not to be pursued further, those same commentaries have provided little constructive guidance, derived from reliable evidence, on directions and opportunities to be exploited with confidence in the future. Nevertheless, from all that has been said, it is reasonable to conclude that there would appear to be little prospect for increasing returns for bulk-commodity produce which has typified New Zealand agriculture until now. Rather, the rural sector will need to devise systems of production and processing which are more responsive to the changing demands of the marketplace and which involve a shift towards the efficient production of high-quality consumer products. If these objectives are to be achieved, knowledge on alternative soil, plant and animal cultural practices will need to be developed and applied; moreover, market intelligence information covering both short and long-term perspectives will have to be taken into account. New developments in many other diverse fields such as engineering, all aspects of business management and information technology will need to be incorporated into the managed development of new systems of farm-to-market production. An integrative approach to this task will be essential.

Clearly, there is an educational dimension in this adjustment process. The rural sector and associated downstream industries will have a continuing, and perhaps increasing, need for the services of well-trained men and women at all levels — from the practitioner to the professional. That said, it is of major concern that many young people and careers advisors have been heard to comment that the rural sector in New Zealand has no future. It is a view that has frequently been encountered during meetings with 7th form students visiting Massey University in the past 2 years in particular. At the same time as the re-structuring is taking place in the rural sector, changes of potential significance for agricultural

education are occurring in other aspects of New Zealand society. Indeed, an in-depth review of education overall — in all likelihood resulting in far-reaching consequences — has been hinted at for some time.

In this address, I propose to share a number of thoughts and ideas on agricultural education in the spirit of promoting constructive debate on the issues involved. I shall use the term education in a general sense and cover aspects of the complete spectrum of research, teaching and extension or advisory activities to varying extents throughout.

#### **Return on Investment**

Given the substantial investment in agricultural education activities in New Zealand — secondary school, technical institute, community college, university, research, farm cadet schemes, advisory services, and so on — the return from that investment, especially insofar as future funding is concerned, is of special interest. Unfortunately, it would appear that accurately quantifying the return to any society from this kind of investment is so complicated as to render the task impossible. Accordingly, heavy reliance must be placed on less tangible evidence, evidence which, unsatisfactory as it might be, is derived largely from value judgments. Nevertheless, it can be claimed that, by any standards, New Zealand has achieved a high level of return from the investment in agricultural education down through the years. The success with which technology transfer has been achieved in the rural sector, thereby generating systems of production widely recognised as being the most efficient in the world, is compelling evidence in support of such a claim. Consider for instance the standard of the farming magazines and journals in New Zealand: if the technical content is any reflection of the general ability of their readership, the level of technology transfer that has been achieved is impressive. By international standards, New Zealand society still continues to enjoy a very high standard of living. The fact that the agricultural sector still remains the major earner of export income (some 50% of total export receipts in 1985) in spite of well-known difficulties — depressed world prices for agricultural products, long distances to markets and high transport costs, unfair competition derived from subsidisation policies elsewhere, inflated input costs

due to import protection policies for the off-farm sectors within New Zealand, climate and pest problems, to name a few — is impressive testimony for the effectiveness of agricultural education and the technology transfer achieved in the agricultural sector. Yet further evidence supporting the claim of a high return on investment in agricultural education is found in other ways, namely; agricultural graduates of New Zealand have performed exceptionally well in post-graduate studies at some of the leading universities overseas; the services of New Zealand trained agricultural advisors are highly sought after for overseas development programmes; many research scientists whose first degree was in agriculture have international reputations for excellence in their field, be it agriculture or some other branch of science. These comments should not be used as a basis for complacency or resistance to change. On the contrary, change in agricultural education is inevitable, the essential point being that the decisions involved must reflect long-term perspectives and the partnership between professionals and practitioners — until now so very effective — must be given every opportunity and encouragement to bring about the degree of innovation necessary for the agricultural sector in New Zealand to meet the challenges which lie ahead.

### University Education

I now wish to focus on agricultural education at university in New Zealand. (In so doing, one should draw attention to the February 1985 issue of the New Zealand Journal of Agricultural Science in which several particularly informative articles on that subject are to be found.)

A fundamental tenet in the philosophy of agricultural degree curricula in New Zealand is that the graduates thereof be able to integrate knowledge across all the component disciplines arising in the broad spectrum of agriculture and yet still have the knowledge capability to embark upon a specialised career within any component discipline if so desired. Designing and implementing degree curricula in accordance with this philosophy is viewed as being an essential pre-requisite for the successful education of applied scientists. Not surprisingly, the *science* of management has traditionally received strong emphasis in agricultural education in this country. Furthermore, a strong awareness of the need for a systems-oriented approach in the successful education of applied scientists has been generated. This philosophy, in conjunction with the major emphasis on candidates gaining practical experience throughout the programme — from working on farms during vacations and from case study and demonstration work involving both university and commercial farms during the academic year — has meant that the agricultural degree curricula in New

Zealand have a record of being noticeably responsive to the changing needs of the rural sector, and also, to the academic advances being achieved in relevant sciences and technologies.

### Course Content

With regard to subject areas, the degree programmes in agriculture in New Zealand are broadly based. Moreover, in the early stages, courses are highly structured with candidates having few, if any, opportunities to exercise subject choice. In some cases, candidates are unable to select subjects deemed appropriate to their particular career interests until they have completed 3 years of university study. Of course, not all educators fully support this approach. Nevertheless, given that candidates entering university are often highly uninformed on what is actually involved with any career they might care to nominate, together with their frequently-stated unwillingness to select a particular career at the entry stage, it is a major advantage to enable a deferment of a binding decision on a career choice for as long as possible. (I might add that in public lectures, this point always attracts the attention of careers advisors.) Opponents of highly-structured degree programmes regularly argue that, for any particular area of specialisation, the candidates have insufficient in-depth knowledge of essential pre-requisite subjects to permit satisfactory levels of attainment in advanced stages of the programme and beyond. Nevertheless, there is ample evidence to indicate that in proceeding to advanced levels of study, be it in science or applied science, graduates of broadly-based and highly-structured applied science programmes have a record for being strongly motivated, especially in learning supporting basic (science) subjects, the relevance of which is regularly queried by those same candidates during preliminary stages of their careers. Taking this point further, it is worth noting that many applied science programmes are structured according to the sequence: pure-science; applied science; application; but in line with previous remarks, there is growing recognition that this is but one education model, the effectiveness of which is almost certainly not universally superior to other approaches, for instance, that involving some reversal of the abovementioned sequence. The latter approach is the basis of a number of emerging programmes in agricultural education.

Returning to the matter of career choice, there are many candidates who, despite having studied for 3 years at university, still find the exercise of choosing advanced subjects and thereby defining their career path, if only in the short term, to be quite an ordeal. This is especially so in the case of honours-level candidates, many of whom will subsequently embark upon a highly-specialised research career.

This is but 1 of a number of reasons for encouraging all candidates for an applied science degree to continue with a broadly-based and integrative programme until completion of the degree, thereby deferring decisions concerning specialisation until entry to post-graduate study. Many educators argue that applied scientists with that experience have a better perspective of the place of their research, not only in the context of the particular applied discipline, but also, in the context of science overall. In addition, applied scientists educated in that way stand to be more adept in establishing priorities in research. The opposing viewpoint is that candidates should be given every opportunity to specialise as early as possible during their degrees — a view often promoted by scientists who are themselves engaged in a highly-specialised field of endeavour. Moreover, the proponents of this viewpoint usually judge the academic rigour of an applied science subject on the basis of the amount of basic science involved, having little appreciation of the rigour involved with the development of lateral thinking ability which is the key element of integrative science and an essential pre-requisite for success with problem-solving exercises of the kind an applied scientist is regularly required to address.

I believe much is owed to the wisdom of the early pioneers in agricultural education in New Zealand whom, judging by the degree curricula currently in place, were aware of the virtues of broadly-based programmes with emphasis of the kind I have described. The success of the graduates over the years — ranging from highly-specialised (and successful) research scientists in disciplines such as mathematical statistics, biochemistry, genetics, reproductive biology, etc., at one end of the spectrum to well-performing agricultural consultants and advisors, either nationally or internationally, at the other, furnishes compelling evidence in support of current education models in agriculture in this country. Educators in other applied science disciplines might well be advised to follow this example.

### Challenges

What are some of the challenges which must be addressed if agricultural education at university level is to remain responsive to the needs of the rural sector in New Zealand?

- (i) As a consequence of the movement towards a more liberal secondary school curriculum, fewer candidates will present for university study having taken the *ideal* range of pre-requisite subjects. First-year programmes at university which more effectively cater for the variability in entrance background of entering candidates than is currently the case will be required.

Furthermore, greater flexibility will be required in the sequencing of courses for particular candidates. A mechanism to enable postponing until later years some of the subjects traditionally taken at early stages in the programme will most likely be required.

- (ii) Nearly all candidates will require greater opportunity to study business-related subjects, for several reasons, namely:
  - There is an increasing demand for such courses amongst entering candidates.
  - If vertical integration of the agricultural industries is to be more effectively achieved than is currently the case, there will be an increasing demand for well-educated graduates in agribusiness.
  - As New Zealand moves further into the *age of information*, all concerned with the agricultural sector will need to develop a stronger awareness of the value of information in a business context. This will especially be the case for the scientists and technologists whose work is funded from the private sector — a development strongly being encouraged at present. Personnel funded in this manner will require a much better understanding of how to cope with the requirements of a commercially competitive environment.
  - Agricultural enterprises in the future can be expected to engage in a greater degree of off-farm investment activity. Managing such enterprises will generate a demand for off-farm business knowledge.
- (iii) In addition to acquiring competence in the science of agriculture in its broadest sense, graduates must also have skills in writing, communicating, information retrieval and interpretation, critical thinking and decision making. Employers often complain about the inadequacies of modern-day graduates in this regard. It is clear that it is no longer satisfactory to expect that the acquisition of such skills can be achieved simply as a by-product of an overall programme.
- (iv) Not all candidates are interested in studying at university in the traditional manner. Increasing numbers of candidates would prefer to study at a distance, and indeed, much more attention should be given to extra-mural education in agriculture — at all levels.

Clearly there is much work to be done in

meeting the needs I have mentioned.

### Role of the Education Institutions

I now want to turn my attention to the topic of the roles of the various institutions offering agricultural education to the tertiary level in this country. It is high time that the relationships between the various institutions and the courses offered be rationalised. Indeed, as far as agricultural education is concerned, the recent announcement that there is to be a review of the administration of tertiary education is to be welcomed. When one reflects on the kinds of questions which pass through the minds of young people contemplating further education in agriculture, the lack of attention that has been given to issues such as the interrelationships between the various courses from the point of view of advancement, recognition of previous education by way of cross-crediting of subjects, exemptions, etc., the current situation is nothing short of embarrassing. Much more coordination of the courses offered by the various institutions is required and clear pathways of progression through various levels of education need to be established. In this regard, a matter of special interest is the offering of sub-degree diploma and certificate programmes by the Universities. Most often, the primary mission of a university is to train professionals in various academic disciplines, but a unique feature of Massey University and Lincoln College is that, since their inception, both institutions have also offered sub-degree diplomas and certificates in agriculture. In the main, the candidates concerned are seeking to become enlightened practitioners for the future. It is my considered view that the interaction between such candidates and university staff is a significant factor in fostering an approach to teaching and research which — at all levels — has a record of being strongly responsive to the human resource needs of the rural sector. In addition, the candidates in these programmes have the added advantage of taking courses which, as a result of the research interests of the staff involved, stand to be right up-to-date.

With the development and progressive upgrading of the courses in agriculture now being offered at several Technical Institutes and Community Colleges throughout the country — most often supported by excellent physical facilities — the role of Massey University and Lincoln College in agricultural education at the sub-degree level has been drawn into question. In my view it would be a retrograde step if Massey University and Lincoln College were required to withdraw their involvement in agricultural education at that level. Based on the criteria by which agricultural educators in New Zealand judge the success, or otherwise, of degree programmes in agriculture, such a move would, in the longer term, be to the detriment of the academic

orientation of the remaining higher-level activities, including research, of those institutions. I believe the feasibility of a joint approach to agricultural education whereby broadly based sub-degree courses are offered by the Universities, to be followed by courses emphasising regional needs at a Technical Institute or Community College working in partnership with the Universities in meeting regional needs at the post-graduate level — especially in relation to continuing programmes — needs exploring. I also believe that greater use of Technical Institutes and Community Colleges as satellite centres to facilitate extra-mural education — at all levels — should be actively pursued. Thus, there are many ways in which the Universities, Technical Institutes and Community Colleges could achieve a greater degree of complementarity — to the benefit of all concerned — in agricultural education than is currently the case. Hopefully, the impending review mentioned earlier will help achieve such a goal.

Finally, a discussion on this topic would be incomplete if mention was not made of the need to examine the interrelationships amongst *all* organisations involved with agricultural education at the post-secondary level. In this respect, I would have to say that it was surprising that major decisions concerning the future role of Flock House in agricultural education could be implemented without, to my knowledge, any discussions of mutual interest with Massey University, located just some 35 km away. There must surely be opportunities for those 2 organisations to work cooperatively in agricultural education. It is imperative that initiatives of that kind be taken in the future, if only to offset the difficulties generated by, in all likelihood, a declining national investment in agricultural education.

### Research

Turning now to research, it goes without saying that, in the longer term, success in agricultural education is dependent upon the acquisition of new knowledge through research. As all members of this Society are only too well aware, the issue of research funding in New Zealand is very prominent at present. The decisions that will finally emanate from the recent Ministerial Review of Science and Technology in New Zealand are awaited with interest, notably those which will determine levels and sources of funding in the foreseeable future. In the meantime, I believe the research community should continue to investigate ways and means for making the existing levels of funding more effective.

Current mechanisms for funding agricultural research — basic or applied — are not viewed as being conducive for maximising the effectiveness of the investment, either in monetary or educational terms. The agricultural research efforts of the

Ministry of Agriculture and Fisheries and the Department of Scientific and Industrial Research in relation to that of the Universities, Massey University and Lincoln College in particular, is in need of rationalisation. A *user pays* policy in research, a policy which is historically foreign to users of research in the rural sector, is, under ordinary circumstances, expected to generate a situation in which public and private sectors would each assume increasing custody of basic and applied research funding, respectively. The current economic crisis confronting the rural sector is such as to cast doubt over the likelihood of the private sector providing sufficient funding for applied research, let alone basic research. Recognising this, together with a declining public sector investment in agricultural research, some rationalisation of the activities of publicly-funded organisations is essential. The need for funding structure which ensures that Universities be able to undertake basic research in agriculture is most surely undeniable. The opportunity for various divisions of the Department of Scientific and Industrial Research and the Ministry of Agriculture and Fisheries to proceed similarly in the future is in doubt.

In the light of these circumstances, serious thought should be given to some of these agencies being incorporated into the university system and fulfill the usual role of a *centre of excellence* in a university, namely, that of providing a means for focussing research issues of national priority. Such a move should assist in preserving the access of staff currently in the Department of Scientific and Industrial Research and Ministry of Agriculture and

Fisheries to a public sector funding for basic research endeavours. Moreover, in being employees of a university, the scientists involved would be expected to engage in teaching, thereby providing a more direct and effective mechanism for disseminating research findings than currently exists. With a greater complement of professional staff, the universities would achieve a much-needed lowering of staff-to-student ratios. The public sector funding of the basic research undertaken by staff in the Universities and associated *centres of excellence* should then be mediated on a competitive basis through a single Government agency with attendant policy advisory council. This system would provide an effective means for rationalising basic research in agriculture throughout the country.

On the subject of applied research, the effectiveness of the Land Grant College System in the United States of America would suggest that applied research and advisory or extension activities should also be centred on the universities, but such a thought needs further study.

### Summary

New Zealand has a record in agricultural education — in the broadest sense — of which we can all be justifiably proud. Nevertheless, the current changing circumstances are such that, if this record is to be sustained in the future, those of us who are currently involved have a responsibility to encourage the implementation of policies which are derived from longer-term and unselfish considerations.