

AGRICULTURAL EDUCATION IN CANADA¹

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As co-habitants of the North American continent we have many similarities and common interests not the least of which is agricultural education. Like many other aspects of Canadian life, agricultural education in Canada today is the result of a British or French heritage and an American environment. In recent years, many of the developments in agriculture in Canada including educational programs, research, and various aspects of production agriculture and agri-business have been influenced by developments in the United States.

Before considering agricultural education in Canada, it is worthwhile to consider the "agricultural geography" of the country.

- (a) the population of Canada is approximately 22 million people, approximately the population of the state of New York. A large majority of the population, however, is physically located in a strip of country 4,000 miles long and approximately 50 - 75 miles wide. This ribbon stretches across the southernmost area of the country and is immediately adjacent to the northern boundary of the United States. The population of 22 million represents a population approximately 1/10th that of the United States,
- (b) like the United States, Canada was settled from east to west. Consequently, the oldest and largest faculties of agriculture are in the eastern parts of the country with the newer and smaller faculties in the western region,
- (c) approximately 30% of the population is located in three metropolitan areas, namely Montreal, Toronto and Vancouver,
- (d) in the early development of Canada food production followed a pattern similar to the population distribution. However, over a period of time this pattern has evolved to a point as now indicated in the accompanying figures illustrating the distribution of population, hogs and beef cattle. (See Figure 1). The Maritime Provinces and British Columbia are notably deficient in the production of both beef cattle and swine. Correspondingly, the province of Alberta produces much larger quantities of these items than its population requires. The entire livestock industry is following a pattern of development similar to that in the United States.

Geographic distribution of people and the areas of agricultural production are significant to a discussion of agricultural education in Canada. There is no question that the population distribution in the country presents many difficulties with respect to educational facilities, transportation, agricultural research establishments, and communications. Consider the difficulties that would arise if the population of the state of New York was strung out in a band 50 miles wide and 4,000 miles long!

Bachelor and Graduate Programs in Agriculture

There are a total of 7 degree granting institutions offering bachelors and graduate programs in agriculture in Canada. All degree granting colleges of agriculture are associated with public supported (provincial responsibility) universities who obtain their funds through provincial departments of education. In their initial stages however, many of these colleges were established as academic institutions and experimental stations under the auspices of a provincial department of agriculture. However,

as the university system grew and developed, all colleges have become associated with a university offering a much wider variety of academic programs.

Table I indicates the population of students enrolled at each of the institutions at both the bachelors and advanced degree level. Also shown in the accompanying table are those students enrolled in two or three year technical programs and the student enrollment in the three faculties of veterinary medicine.

The typical bachelors degree program at a college of agriculture in Canada is four years in length. Generally speaking, the first two years represent a science based curriculum involving many courses in chemistry, biology, mathematics, and physics in addition to introductory courses in broad agricultural areas. Students enter a major or area of specialization for the final two years of their program: any one particular institution may offer from 8-15 different areas of specialization.

Graduates of the B.Sc. (Agr.) degree programs have accepted a variety of employment opportunities upon graduation. Table 2 indicates the types of employment opportunities followed by B.Sc. (Agr.) graduates for the period 1967-1973. There is noticeable increase in the number of students going into farming upon graduation and a corresponding decrease in students entering research and government positions. This shift reflects in part the decrease in funds available for research and the "hold the line" budget policy in recent years of various government agencies.

Graduate Education

Graduate programs at the Master's and Ph.D. level are available at all of the institutions described with the exception of the Nova Scotia Agricultural College. Graduate student enrolment, indicated on Table 1, is approximately 1,000 students in all of Canada. This represents a ratio of approximately 1 graduate student for every 3 undergraduate degree students in the faculties of agriculture in Canadian universities. Many of the graduate students enrolled in Canadian institutions are from other countries. The majority of Canadian faculty members in Colleges of Agriculture have taken their graduate education at colleges in the United States rather than in Canadian universities.

As one might expect, graduate programs have not developed in all areas of agriculture at all institutions. The development of graduate programs has closely followed the development of research programs. Inasmuch as major research programs are funded by provincial departments of agriculture, and thus have a regional context, the graduate programs available at any one institution tend to reflect the regional interest of that institution.

I do not believe that Canada will ever be able to substantiate any claim towards major expertise in the field of agricultural research. While specific research programs at individual institutions may rise to the surface as being internationally renowned, it follows that agricultural research in Canada, given the nature

Table 1
1972-73 Student Enrolment - Canadian Faculties of Agriculture

	N.S.A.C.	Laval P.Q.	Macdonald P.Q.	O.A.C. U of G	U of Man.	U of Sask.	U of Alta.	U of B.C.	Ttl.
2 or 3 yr. Diploma in Agriculture	176	-	55	281*	182	203	*	*	897
4 yr. B.Sc. (Agr.) including Food Science and Forestry	140**	320	336	1003	365	277	513	251	3205
Total Undergrad.	316	320	391	1284	547	480	513	251	4102
M.Sc.	-	85	91	147	85	64	93	76	641
Ph.D.	-	27	65	52	83	24	59	38	348
Total Graduate	-	112	156	199	168	88	152	114	989
Veterinary Medicine	-	226	-	366	-	235	-	-	827

* Other non-university institutions in province offer Diploma programs in agriculture.

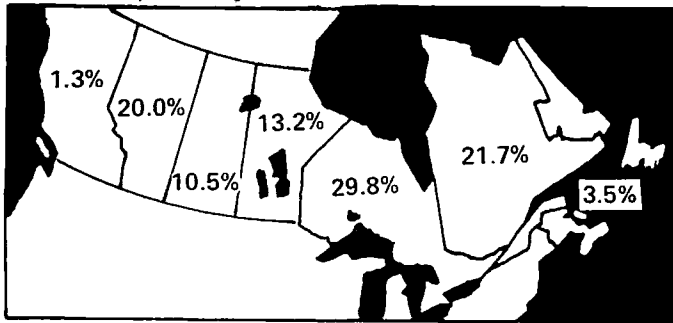
** Freshmen and sophomores only - transfer to Mac or OAC

Table 2
Careers of B.Sc. (Agr.) Graduates - OAC

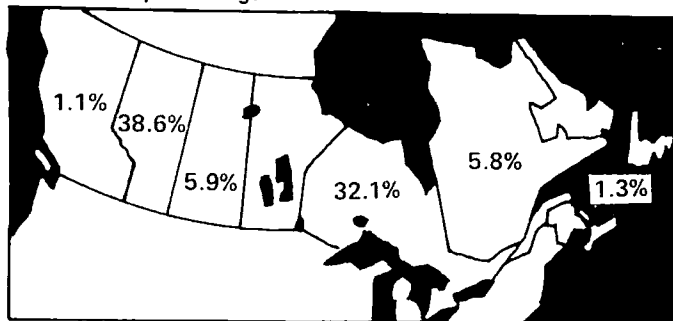
	1967	1970	1973
Farming	4%	10%	20%
Research	23	20	15
Industry	27	17	20
Government	16	7	10
Other	30	46	35
	100%	100%	100%

Figure 1

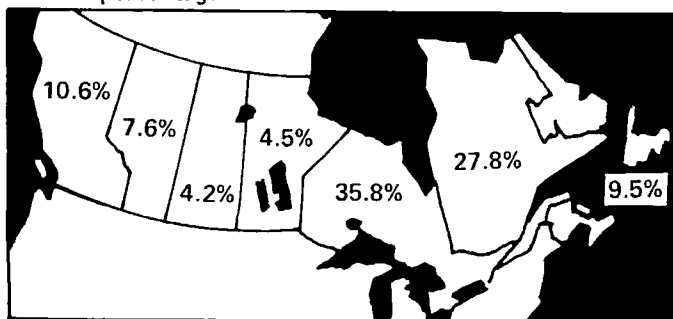
Hog Gradings By Province - 1972
- percentage -



Cattle Slaughter By Province - 1972
- percentage -



Where Meat Is Consumed
- percentage -



of funding and the geography of the country, will never reach the levels attained in the U.S. This view has been expressed by a number of research administrators in recent years and is understandable when one considers the following:

There are approximately the same number of dairy cows in the state of Wisconsin as there are in all of Canada; there are more hogs raised in Iowa and Illinois than in all of Canada. Since research in both of these areas is going to be spread between six or seven faculties of agriculture and the federal research station system operated by the Canada Department of Agriculture - faculties of agriculture receive $\frac{1}{4}$ of the agricultural research dollars, federal $\frac{1}{4}$ - it follows that the tax base and production base for supporting research in these areas is minimal and spread over a country 4,000 miles wide.

Agricultural Research in Canada

The Canada Department of Agriculture operates a series of

research stations that have historically been spread across the entire Dominion. Although there has been some attempt in recent years to centralize areas of expertise and research, the federal system has been established for many years on a geographic basis. The total operating budget of the Federal Department of Agriculture is in the order of \$65,000,000 annually. To focus this figure in relative terms one should consider that the provincial research budget in Ontario is less than \$10,000,000 annually; Ontario being a province representing 1/3 of the population of Canada.

I believe that one of the major problems of the future to confront agricultural education in Canada will be research funding and support for graduate students. As long as the major source of funds for agricultural research is at the federal level and the major responsibility for education is at the provincial level, it is apparent that the coordination of research programs and graduate educational programs will be difficult. At the present time, faculties of agriculture in Canada are taking steps to attempt to solve and reconcile some of these difficulties. However, it is not likely that the federal government will be prepared to accept reduced responsibility for agricultural research nor is it feasible to expect provincial governments to be able to devote more funds for agricultural research at a time in history when programs in health, welfare and social services are uppermost in the minds of politicians.

With a few exceptions, the federal research stations are not located in the same city or region in which the faculties of agriculture are located. Consequently, there is geographic difficulty in collaboration between university researchers and researchers of the Canada Department of Agriculture. If these stations and the faculties of agriculture were located in similar areas, there would be much more collaboration between researchers on areas of common interest and federal research scientists would be involved in research planning by the federal government.

Two Year Programs in Agriculture

Two year diploma programs in agriculture exist at five of the eight institutions offering undergraduate degree programs. These institutions however by no means represent a major portion of the two year programs in agriculture. There are a number of other institutions offering technical education in agriculture; these institutions were established and are funded by provincial departments of agriculture. For example, the Ontario Department of Agriculture and Food operates four colleges of agricultural technology located in various regions of the province in addition to the Diploma Program at the University of Guelph. A similar pattern exists in Alberta where the Alberta Department of Agriculture offers technical programs at three institutions throughout the province.

In addition, two year diploma programs have been initiated by a number of community (junior) colleges. The development of community colleges has occurred during the last 5-10 years in most parts of Canada. Even though provincial departments of agriculture have been in this business for many years, a number of community colleges are now offering two year programs in agriculture, farm production, horticulture, and other specialty areas that might be included in a broad definition of agriculture. There is little coordination between these institutions primarily because the responsibility for them is split between two departments of government. The community colleges are responsible to and obtain their funds from the provincial ministry of education. Consequently, it is difficult to reconcile differences of opinion on educational policy as it relates to agriculture because the interest and backgrounds of the personnel in each of the two departments is somewhat varied.

The previous table showing student enrollment does not include the enrolment figures for two year programs at colleges of agricultural technology other than those that are directly associated with a particular university. When one includes all of the different institutions and programs with an agricultural connotation, the enrolment of students in two year diploma programs is

roughly equivalent to the enrolment in four year baccalaureate degree programs.

Recent Problems Confronting Colleges of Agriculture

During the 1960's there was a move to formula financing on per student basis of universities by most provincial governments. Consequently, the income for colleges of agriculture became dependent on the number of students enrolled. As one might expect, the whole question of student recruitment became a very topical issue and one in which almost every college of agriculture was vitally interested. We experienced the same difficulties and concerns that I believe you have in this country; namely, that many students in high school were not aware of the opportunities available to them following completion of a degree or a diploma course in agriculture. Since 1945, the population of farm people in Canada has declined from approximately 20% to 7% in 1971. It is apparent that the colleges must attract an ever increasing number of students from urban and metropolitan areas if they are to continue to have a viable student body. The recruitment programs initiated followed a pattern similar to those initiated in the United States. There was a distinct emphasis placed on science aspects of the curriculum and an overt attempt to distinguish between the words agriculture and farming.

These programs have been effective; the enrollment in colleges of agriculture has increased during the past 5-7 years and although it is subject to year by year fluctuation, the general trend is upwards. We were able to withstand the big swing in student popularity that took place in the late '60's in the direction of the social sciences. At the present time, high school students seem even more concerned about their future employment following university graduation and professional programs particularly agriculture, forestry, and programs related to environmental studies are enjoying increased popularity. We believe that this is a particularly significant trend at the University of Guelph as the degree program in agriculture is the only program on campus that will have an increase in the freshmen class this fall.

A College of Agriculture on the University Campus

Colleges of agriculture now find themselves as relatively small colleges on large university campuses insofar as student enrolment is concerned. For example, the extreme situation in Canada is at the University of British Columbia; the college of agriculture has an undergraduate student population of 250 students on a campus of 20,000! Even in the best of situations the proportion of students in agriculture is something of the order of 15% of the overall student body. This situation has resulted in Deans of agriculture being confronted with a continuing struggle to assure that the college of agriculture gets its fair share when the budget of the university is allocated to the various faculties and colleges.

There is no question that agricultural education is costly; with relatively small enrollments and many different specialty areas, enrolment in senior level courses is much lower in the college of agriculture than in other colleges of the university. Consequently, we face continuing pressures to increase the student faculty ratio, decrease the support staff to faculty ratio, and other administrative gimmicks that university comptrollers use to make educational dollars stretch even further than they do at present.

Colleges of agriculture in Canada have generally taken the position that when students in agriculture take courses in the basic sciences, these courses should be provided by the appropriate faculty in the university as opposed to the college of agriculture. With the increasing concern of student enrolment there is a tendency to think about replacing a course in chemistry given in the faculty of physical science with a course in chemistry given by an agricultural college faculty member in animal nutrition or soil science. While this pressure exists, I believe that we must attempt to resist moving in this direction as it will inevitably result in a more biased, introspective curriculum. At the same time, there is an increasing concern among students in the colleges that the courses they study in the basic sciences should be

more relevant and have direct application to their area of interest. The major danger in moving in this direction is that students and faculty in the college of agriculture would become isolated from the university community; a move that in the long run would be disastrous.

A specific aspect of the university with which a college of agriculture must work in harmony is the college of biological science. As programs in agriculture become broader in scope and include areas of study such as resource management, environmental biology, forestry, and other areas dealing with natural resources and environment it is apparent that there is some conflict of interest between the College of Agriculture and the College of Biological Science. The Colleges of Biological Science are affected by the same formula financing and student enrollment pressures and are attempting to develop programs in the same areas. I believe that one of our major requirements in colleges of agriculture in the balance of the 1970's will be to establish ways and means of collaborating and cooperating with other colleges in the university in teaching and research programs that are of an interdisciplinary nature. Many attempts have been made to facilitate interdepartmental and interdisciplinary cooperation; however, the track record to date indicates fewer success stories than failures in this respect. It has become apparent that interdisciplinary programs will not succeed until individuals participating in them see themselves as making an interdisciplinary contribution as opposed to the contribution expected of a specialist. It is obvious that if colleges of agriculture are to be involved in programs of an interdisciplinary nature that a policy of anti-isolationism must be pursued.

I have already alluded to the current situation in Canada with respect to agricultural research budgets and the relationship of university researchers to the federal department of agriculture. It is fundamentally apparent that agricultural scientists must put their own house in order and reconcile their differences before any move can be expected to succeed that involves other departments of government in areas such as consumerism environment or resources or other colleges in the university. Although some would disagree, I am convinced that research and educational programs in agriculture must be developed in harmony with other elements of society if they are to be successful. During the last several years, I have had opportunities to meet with study groups from colleges of agriculture from a number of different countries. It is apparent to me that while our local problems may vary from one institution to the next, there is a great deal of similarity in the situations with which we are confronted and the means whereby these situations can be resolved.

New Developments to 1980

During the past 10 years the emphasis in research and educational programs in colleges of agriculture has expanded and now includes much wider range of interest. In the 1950's and early 1960's we were primarily concerned with the "two blades of grass" philosophy. The major concern was efficiency of production and increased profitability to the farmer. During the 1960's we began to recognize that production agriculture was part of an overall agriculture and food system and that marketing, food processing and consumer behaviour were of increasing importance. During the latter 1960's and into the 1970's colleges of agriculture have been looking even further than the agriculture and food system. Some of the recent topics of conversation and projected future developments are as follows:

1. Research and Educational Programs dealing with Environmental Quality. While agriculture has been primarily on the defensive in face of the environmentalist criticism there is a growing awareness amongst agricultural scientists of environmental quality and the effects that agriculture has on a particular environment. Tangible signs of interest in this area have already been demonstrated as a number of colleges have developed majors emphasizing resource management, environmental biology and ecology.

2. Land Use Planning. With increased competition from cities and industrial developers, agriculture is confronted with the

whole problem of land use and the delineation of land for agricultural purposes. In the past 18 months, 3 of the provincial governments in Canada have taken positive action in placing freezes or extensive review procedures on the sale of farm land. This question is of an immediate nature and one to which agriculture must successfully respond. I believe that there is a great deal of sympathy and support for the concept of land use planning in agriculture from all sectors of society with the possible exception of one. The individuals most affected by agricultural land use planning are those that are now using the land for agricultural purposes, namely, the farmer. Their concern in the government imposed freezes on the sale of land is one of self interest and is of legitimate concern in that their farm may represent their total lifetime productivity. To be prevented from selling that asset at \$3,000 or \$4,000 per acre to an industrial developer is, in their opinion, an infringement on their rights as an individual. There is no question that a great deal of ingenuity and forward thinking is needed among agriculturalists if any semblance of a viable land use plan is to be developed and implemented.

3. Rural Development and Rural Communities. Renewed interest has been shown in recent years in the development of rural communities and the changing patterns of these communities. These developments will require colleges of agriculture which have been primarily production oriented to add a social science dimension in their faculty, education programs and research.

When one considers that the top 20% of farmers are producing 80% of our agricultural produce and that 50% of the farmers in Canada are 52 years of age or older, it is apparent that many changes are going to take place in the composition of rural Canada in the next few years. Farm population has been steadily declining and is expected to continue to decline to a 3 to 4% level in the 1980's. Government programs at the federal and provincial level are being initiated to facilitate the adjustments that are going to occur in rural communities.

Summary

Agricultural education in Canada has developed since 1874 and its development reflects to some degree the geography, politics and educational philosophy of the country. More recently, curriculum development and research activities have been influenced by developments in the United States.

The problems and concerns of both colleges of agriculture and agricultural industry have many similarities to those with which you are confronted in the United States. One would expect that agricultural educators could mutually benefit from an "international discussion" of similar programs.

¹ Paper presented at the NACTA Conference, Cobleskill, N.Y., June 14, 1973 by G. M. Jenkinson, Ontario Agricultural College, University of Guelph, Guelph, Canada.

THE TRANSFER DILEMMA

Harold J. Ecker

The Problem

Students enrolled in technical programs are similar to students in four-year degree programs in at least one respect — they often change their career goals. Many technical students request transfers to other academic programs. In the Institute of Agricultural Technology at Michigan State University, 20-25% of the graduates transfer to a four-year degree program in agriculture. At some institutions the percentage of transfers is even higher. I am told that over 30% of the technical graduates from our host campus (Cobleskill) transfer to a degree program at Cornell or elsewhere.

Four-year college admissions counselors face two problems as they review applications from technical graduates:

1. What criteria should be used to determine if the technical graduate has a reasonable chance of success and should be admitted to a degree program?
2. Once admitted, how should the technical credits be evaluated in terms of credits towards a degree?

Four-year colleges have struggled with these questions for at least 75 years. Policies regarding the transfer of technical graduates vary widely from institution to institution. For example, graduates of the Institute of Agricultural Technology have received from 0-90 term credits at four-year colleges of agriculture in the U.S. I would be hard-pressed to defend either of these extremes.

A number of four-year institutions have adopted what appears to be a reasonable approach to this transfer dilemma. A three-fold increase in technical students in agriculture in the last seven years has magnified the need to establish guidelines for transfer that are fair to both the student and the institutions involved.

The National Association of Colleges and Teachers of Agriculture is a logical organization to work on the articulation between technical and professional programs in agriculture and natural resources. To stimulate the thinking of this group I would like to discuss four areas:

1. Implications of the growth of technical education.
2. The type of student in technical programs.
3. How technical students have performed in degree programs at Michigan State University.

4. Possible guidelines to help solve the transfer dilemma.

The Setting

Technical education is not a new phenomenon — the national emphasis on this type of education is new. During the period from Sputnik to the early 1960's the proponents of technical education were pretty much talking to themselves. Since 1963, however, technical education has come to be regarded by educators, government officials, taxpayers, and parents as an area of great need.

Today the majority of the job openings in many fields, including agriculture, are at the technician level, and it appears that this emphasis will continue throughout this decade. A recent U.S. Department of Labor study, which covers all occupational areas, indicates that only 20% of the jobs that will be open in the 1970's will require a bachelor's degree or higher(1). There is evidence that a similar situation exists in many agricultural career areas. An AAJC study(2) estimates that agricultural firms will need three post high school vocational/technical graduates for every degree graduate in this decade.

U.S. colleges are currently turning out about the same number of technicians as degree students in agriculture and natural resources. Last year, about 10,000 young men and women completed 1-3 year technical programs in agriculture in the U.S. In the same period, about 10,000 bachelor's and 2,000 master's and doctoral degrees were granted in agriculture and natural resources(3).

The Growth of Technical Education in Agriculture

The growth of 1-3 year technical programs in agriculture and natural resources has been dramatic since 1966. (Figure 1) The number of programs has more than doubled in seven years. The number of students enrolled in technical agricultural programs has increased from about 10,000 in 1966 to over 30,000 in 1971-72.

The prospect of less financial support for technical education from state and federal sources may cause a leveling off of new programs. However, given the current demand for technicians