100+ Years of Dairy Foods Research, Teaching and Extension at the University of Guelph

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The Ontario Agricultural College and the University of Guelph

Agricultural education at Guelph began when the Ontario government purchased a 500-acre farm for its new Ontario Agricultural College, which opened in 1874. In 1903, OAC was joined on campus by the Macdonald Institute, which provided instruction in domestic sciences. The Ontario Veterinary College became the third college to join the campus in 1922. In 1964, these three colleges were joined as a single institution, the University of Guelph. Within 10 years, they were enhanced by the additions of the College of Arts, the College of Physical Sciences, the College of Biological Science and the College of Social Sciences. Today, the 1000-acre campus is home for 16,000 undergraduate and 2000 graduate students (including 700+ international students from more than 100 countries), 800 faculty and 2500 staff.

Historical Highlights of the OAC

May 1, 1874 OAC opens with 28 students admitted.
1887 The degree program is launched.
1891 Initiation of short courses for the general public.
1920 High school matriculation required for admission qualification to the degree program.
1926 Graduate programs initiated.
1964 OAC is a founding college of the newly created University of Guelph.
2006 More than 3200 students are enrolled in undergraduate, graduate, and diploma courses at OAC's four campuses.

OAC Extension and Dairy Industry Training

The Department of Dairying was established at the OAC in 1885. Its first effort at extension was to send out a 'Dairy Train' in 1891. This consisted of a railway car completely equipped to demonstrate new techniques of manufacture of dairy products both in the factory and on the farm. For four years it moved about the province providing instruction in the latest findings from the college. One result of this effort was the realization that there was a need for efficient instruction of the large number of personnel involved in the dairying industry. This led to the founding of the Dairy School in 1893. The first course was received enthusiastically by the 65 students who were chosen to enroll, and resulted in the building of a new dairy building containing processing equipment and a complete set of apparatus for milk testing. More than 3500 students attended the OAC Dairy School during its 77-year history as a 3-month program offered annually. The first curriculum consisted of basic and applied sciences as well as three laboratories, buttermaking, cheesemaking, and milk testing. Laboratory work commenced immediately after the morning lectures and continued until each student had finished their assignment. One offshoot of the dairying activities was a supply of dairy products. In 1924 the Department opened a store to offer their wares to the community, a venture which lasted 50 years.

First Dairy Class at the OAC, Guelph, Jan. 1893

Dairy Science Education and Research

2-year diplomas and 4-year degrees in Dairying were offered beginning in 1886. Tuition in 1906 was $8/semester; board was $3/week, including laundry. Research priorities during the early could be summarized as the causes and prevention of quality defects, the development of new and improved methods of processing, and the development of new products. Prof. H. H. Dean, Chair from 1891-1932, was a founding member of ADSA in 1906. The Dairying Dept., later the Dairy Science Dept., was widely recognized as the premier institution of its kind in Canada and enjoyed a worldwide reputation in dairying. In 1968 the Dairy Science Dept. was renamed and expanded to the Dept. of Food Science. For a number of years following, students could follow a B.Sc.(Agr.) program in Dairy Science or a B.Sc. program in Food Science, but today only the latter is offered. Dairy research was also maintained and is still a mainstay of the current Department.

Examination in Second year Dairying, June, 1886
Examiner - J. W. Robertson

1) *Give reasons why dairy farming is preferable to exclusive grain growing.*
2) *State the main characteristics of a good dairy cow.*
3) *How might the quality of milk from an ordinary herd be improved?*
4) *Compare the relative profits from heifers dropping their first calves at two and three years respectively.*
5) *Describe the most economical method of feeding dairy cows, while not milking, during the winter.*
6) *What treatment would be effective in removing leaky taint from milk and to what class of taint does it belong?*
7) *State the methods of separating cream from milk and say what considerations would guide you in determining as to which is preferable.*
8) *What is the average composition of milk, butter, and cheese?*
9) *State the proper range of churning temperatures, and briefly describe the process of buttermaking from the time churning commences.*
10) *Name the qualities, with comparative points of value, possessed by perfect cheese.*
11) *How would you be guided in selecting places whereon to erect a creamery and a cheese factory?*
12) *What is rennet, and what is its action in cheese making?*

Milk Analysis Research and the Central Milk Testing Laboratory

During the 1950's and 60's much effort in the Dairy Science Dept. was devoted to testing of milk. In 1961 a study of the composition of Ontario milk began that involved testing of 1200 cows from 40 dairy herds. The testing procedures proved time consuming and costly. Prof. D. A. Biggs began research to discover better and more rapid tests. The Infrared Milk Analyzer (IRMA) proved capable of determining the percentages of fat, lactose, and protein in a small sample of milk in approximately one minute. This equipment was first displayed in 1962 at the National Institute for Research in Dairying at Reading, England. By 1965 the first commercial model was installed in the department at Guelph. Professor Biggs' work showed that while IRMA could perform the required tests, it was in need of considerable modification. Based on his work, the equipment was improved sufficiently for the government to establish the Central Milk Testing Laboratory in 1967 in Guelph. It was the first milk testing centre to be established in Canada and the first IRMA equipped facility in the world. Today, with 5000 dairy producers in Ontario, the Laboratory Services division of the University of Guelph tests more than 400,000 samples each year.

Dr. Les Szijarto, milk composition study, 1961.

Cheese and Ice Cream Technology Training

Instruction in cheese technology was included in the 3-month Dairy School program since its beginning in 1893. In 1956, Professor Donald M. Irvine took over cheese training in the Dairy Science Department. After the Dairy School was closed in 1969, Dr. Irvine continued to teach annual short courses in cheese technology until his retirement in1985. Professor Arthur R. Hill, who completed both his M.Sc. and Ph.D. degrees with Dr. Irvine, has taught an annual 1-week course in cheese technology since 1986. Dr. Irvine was honoured in April, 2006, to mark 50 years since his first course.

Ice cream short courses began in 1914, as a 2-week option for students at the end of the regular Dairy School program, and have continued annually ever since. In their 90+ year history, these courses have been taught by only 4 faculty, Prof. Dan McMillan (1914-1922), Prof. Harry Smallfield (1923-1955), Prof. Sandy Pearson (1956-1986), and Prof. Douglas Goff (1987-curent). This is the longest-running continuing education course at the University of Guelph and one of the few well-established ice cream courses worldwide. It has taught more than 3000 clients from all corners of the world. The current week-long course, offered annually the first week of Dec., covers all aspects of ice cream science and technology - from ingredients and processes to quality of the end product.

The ice cream class of 1960, with Prof. Sandy Pearson, far right.

Establishment of the Dairy Research Chairs and Current Research

By the late 1980's, the core group of dairy faculty that had led the department for many years were retiring, and a significant external reinvestment in dairy research took place. Profs. Douglas Dalgleish (Industrial Research Chair in Dairy Science) and Milena Corredig (Jr. IRC) are funded by the Ontario Dairy Council, the dairy processor trade association. The activities of their research group focus on improving the quality and functional properties of milk proteins, understanding the changes in milk constituents when they are subjected to processing and studying the interactions that occur between milk components and other food ingredients. Professor Mansel Griffiths (IRC in Dairy Microbiology and Safety) is funded by the Dairy Farmers of Ontario. His group studies how dairy micro-organisms interact with, and adapt to, their environment. They are developing rapid, easy-to-use tests to confirm the safety of dairy products. The Chair groups and other faculty members in the department form a critical mass actively working in dairy research and training highly qualified personnel for the Canadian and international dairy industries, carrying on the legacy of 100+ years of dairy science at Guelph.

Scanning electron microscopic image of a casein micelle emerging from current research at Guelph, leading to a better understanding of micelle structure and behaviour.

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