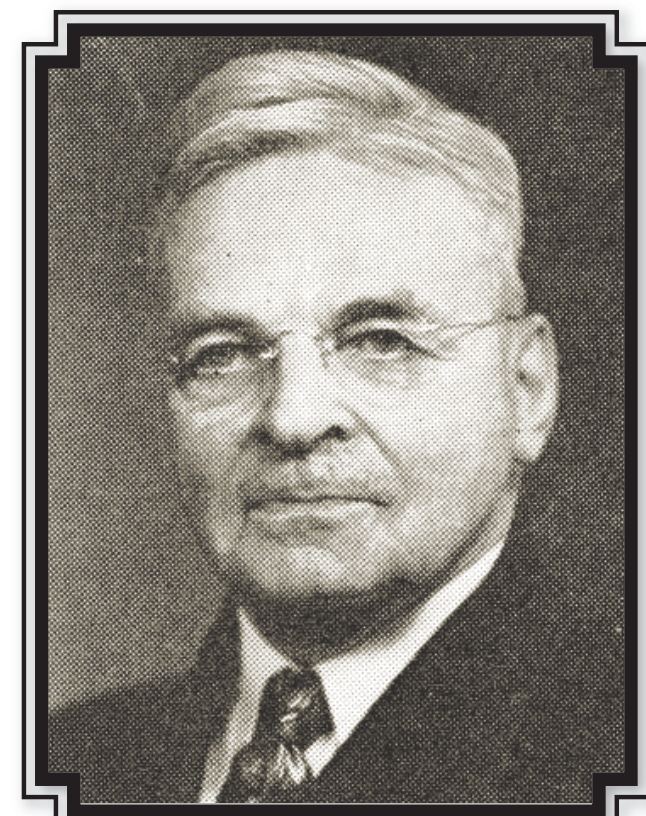


A Century of Dairy Science at Purdue University

James V. Chambers, Professor Emeritus of Food Science

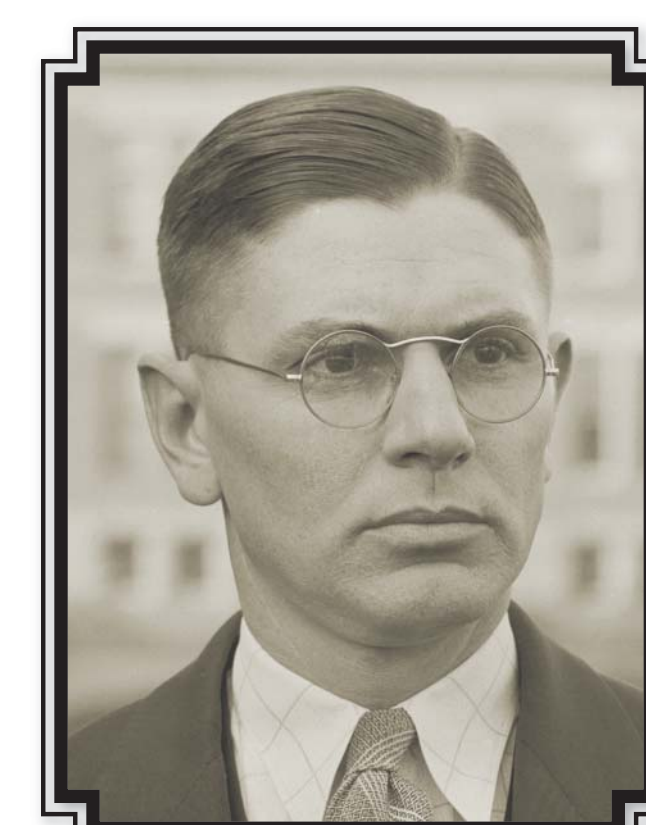
Dairy Industry Contributions

With the vision and leadership of **Otto F. Hunziker**, dairy science and technology evolved at Purdue University. In 1905 Purdue experienced a sharp growth in its agricultural programs. Professor Hunziker seized upon the opportunities to serve this growing agricultural sector. He identified needs for developing educational programs to better educate dairymen and needs for instituting adequate dairy laws for the protection of the dairy industry. His scientific treatises dealt with the solution of problems on dairy farms and in dairy plants. His research established accuracy of glassware and provided standard methods for the Babcock fat test of milk and cream. He planned Smith Hall and adjacent creamery which was built in 1913. A champion for the dairy industry, he won recognition in the fields of butter making, condensed milk and dried milk. He incorporated scientific principles into every step of the butter-making process. His textbooks were used by agricultural universities in dairy courses throughout the United States and in other dairy countries.



Ollie E. Reed organized and established a Purdue University dairy farm in 1919 for the purposes of instruction and research in milk production and dairy herd management. As the operation grew, the dairy farm became a primary source for supplying dairy products at the Purdue campus.

Howard W. Gregory provided outreach program leadership for the department during his tenure from 1918-1960. Among his contributions, he introduced the "Four-Day" system of cream grading, developed analytical methods for detecting adulterated butter, examined the environmental factors affecting the deterioration of butter during storage, investigated the enzymes present in butter and their role on the hydrolysis of protein during butter storage, examined the causative factors that influence the "sandy" defect in ice cream and introduced the use of airtight sealing of milk and cream bottles for stabilizing flavor quality.



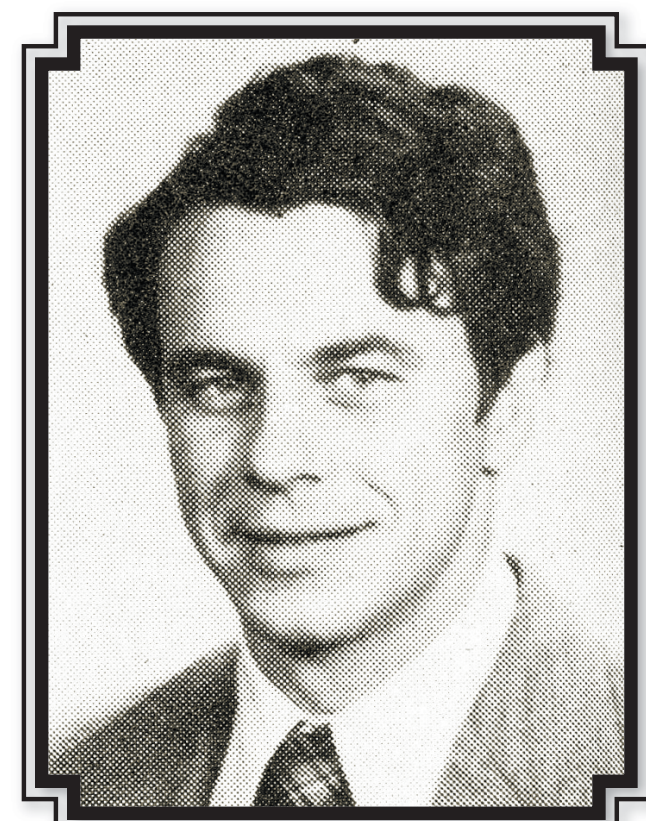
The research of **Elliot H. Parfitt** is well recorded in ADSA journals. During his 17 years as a dairy bacteriologist, starting in 1921, he focused much of his research on seven specific bacteria groups associated with cream and the manufacture of butter. He quantified the bacteria groups as to their proteolytic activity on milk proteins. He assessed the effects of chemical sterilizers in dairies. Another area of Parfitt's study was to assess various washing and disinfecting protocols for sanitizing milking machines. He found that milking machines could be sanitized adequately by first rinsing out the milk residue with cold water followed by a hot water rinse, then filling the teat cups with a diluted alkali solution. This sanitizing protocol eventually became accepted by dairy producers and was approved by the Indiana State Board of Health.

Fredrick J. Babel – scholar, teacher, mentor and outstanding researcher – left a legacy of knowledge for researchers and management in the dairy food industry. From 1947 until his retirement in 1978, he taught courses at Purdue in food and dairy microbiology and sanitation. He served as faculty advisor for more than 350 undergraduate students and major professor for 18 MS and 14 PhD degree students. As a researcher, he developed the Purdue Baby Swiss cheese which has been commercialized continually since the 1950s. He developed a specific cultured dressing for use on creamed cottage cheese that extends the shelf-life and adds flavor to the eating qualities of cottage cheese. He identified critical practices at the farm and handling practices in raw milk at the dairy plant that had an impact on quality and cheese yield. He characterized lactic culture behavior in cheeses and fermented milk. In 1957 he coauthored a textbook with B. W. Hammer entitled *Dairy Bacteriology* which remains today a useful reference throughout the dairy industry. His research on lactic cultures and phage led to the cheese industry practice of rotating starter cultures to prevent bacteriophage infections.

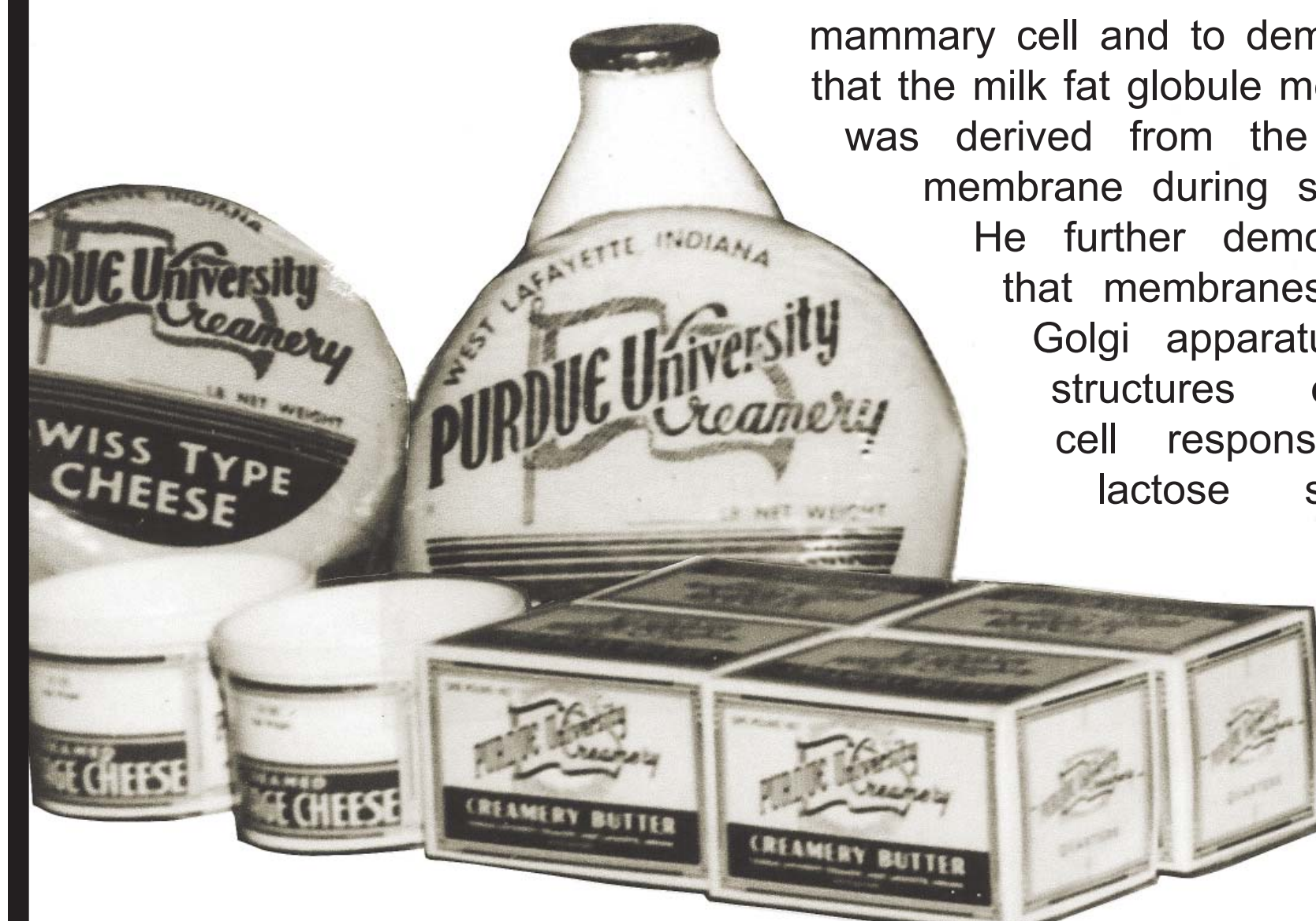


Thomas W. Keenan came to Purdue in 1967 as a biochemist with an emphasis on cell physiology. Dr. Keenan mastered the techniques of the electron microscope which he used in his research activities.

He was the first to isolate the plasma membrane from the lactating mammary cell and to demonstrate that the milk fat globule membrane was derived from the plasma membrane during secretion. He further demonstrated that membranes of the Golgi apparatus were structures of the cell responsible for lactose synthesis



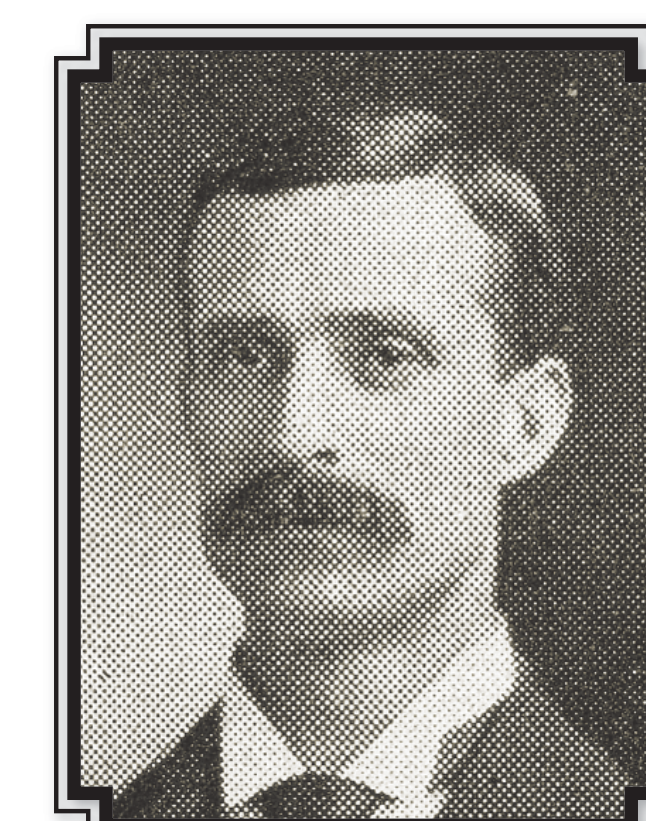
and regeneration of the plasma membrane given up to fat globules.



In 1983, **S. Suzanne Nielsen** joined Purdue University as a teacher-researcher in the newly formed Department of Food Science. Her teaching of the Food Analysis course led her to edit a Food Analysis textbook, which currently is in its third edition and is used widely. When she joined the department, there was interest in the role of proteolytic enzymes native to the milk system that appeared to remain active after milk had been treated at ultra-high temperatures. The enzymes allowed the development of a "gel" structure after five to six months of storage. Thus, Dr. Nielsen's long-term research goal has been to understand the components and regulation of the plasmin enzyme system in milk in order to improve the quality of dairy products and reduce product loss.



Indiana Outreach

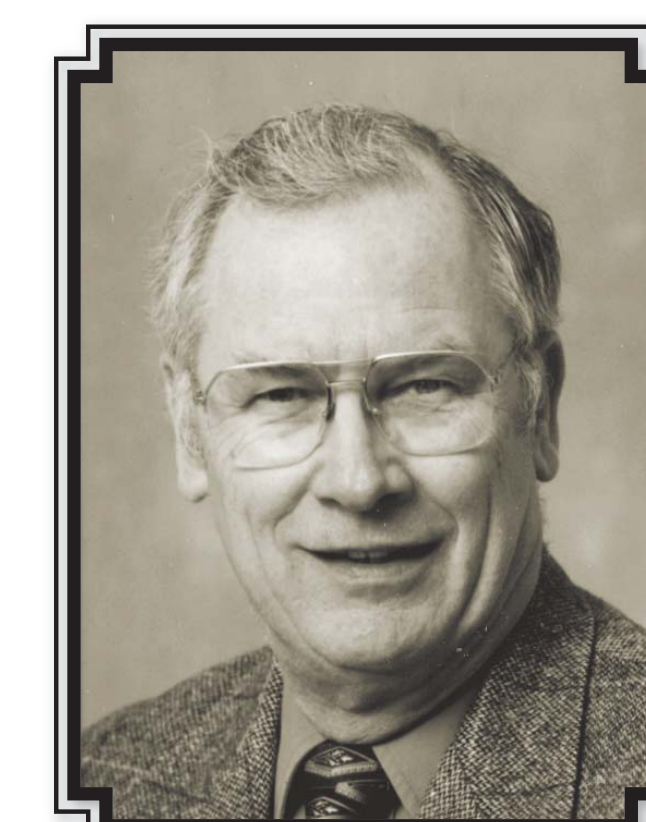


Prior to 1905, **C. S. Plumb** organized the dairy industry in Indiana. Breed associations evolved and butter manufacturers came together for informational meetings organized jointly by Purdue and the creameries. When Otto Hunziker came on board, he pushed for educational programs focused on dairy production practices, improved sanitation practices during milking and bottling and proper butter making and handling practices. He gathered support from the Indiana legislature for funding an extension faculty position at Purdue in 1913. Hunziker introduced dairy short courses to serve the educational needs of dairy farmers and manufacturing personnel. Producing a quality product became the overall theme.

During 1913 and 1914, with the cooperation of the Southern Railroad Company, the Purdue Dairy Department organized a *Special Dairy Train* that ran across southern Indiana, making stops in farming communities between New Albany and Princeton. The train provided educational opportunities for dairy farmers in production practices and breeding. So successful was this traveling classroom that a second dairy train was organized in 1915 to serve the dairy communities in central Indiana. In ensuing years, through 1928, the B&O, New York Central and Monon Railroad companies got on the dairy band wagon. Dairy farmers from a total of 47 counties benefited from hands-on demonstration programs.

The next major player in extension was Howard Gregory. As Indiana's milk production increased, Gregory continued Hunziker's outreach programs and added his own. Extension publications proliferated. He began training county extension agents on latest technology. He trained Vo-Ag teachers on dairy production practices. In 1924 he began communicating with the dairy community via broadcast from Purdue's own radio station WBAA. He participated in the State Fair, worked with the State Livestock Board to eliminate disease from dairy herds and in 1937 began annual conferences at Purdue covering timely topics. In 1947 he initiated *Dairy Caravans* to provide educational service to 52 counties involved in dairying.

During the reorganization years of the Dairy Department, Animal Husbandry and Animal Sciences, **J. Orville Young** was hired as the Extension Specialist in Milk Quality and Technology. During his 1961-1973 tenure, he set up workshops for milk cooperative field personnel and State Board of Health sanitarians. He instituted the Purdue annual Dairy Industry Conference. He published bulletins on milk quality-related topics and continued the county agent training. He journeyed around the state, assisting farmers and manufacturers on quality issues.



James V. Chambers replaced Orville Young in 1974 and moved into the newly formed Food Science Department in 1983 as Extension Food Scientist. During his 26-year tenure, he saw a shift away from small dairy farms and to large, incorporated dairy operations and from numerous smaller dairies to a handful of streamlined, regional dairy plants. Adjusting to the new landscape, his outreach programs focused on contemporary issues facing the extremely competitive dairy industry, including dairy foods and niche manufacturing and marketing and waste management. He provided the driving force for eliminating Polychlorinated Biphenyls (PCB) from the milk supply and establishing an antibiotic avoidance program. He worked closely with the industry to address municipal sewer use ordinance issues and to develop strategies to achieve compliance and waste reduction. He initiated programs to implement Good Manufacturing Practices (GMPs) and Hazardous Analysis Critical Control Points (HACCP) concepts into quality assurance protocols to eliminate entry of milkborne microorganisms into the processing environment.

In current years, a new outreach platform has emerged. Agricultural-based, innovative, small businesses are flourishing. Purdue Food Science Department is stepping up to meet the needs of these entrepreneurs in technical and regulatory support.

Laying a Foundation for the Future

Throughout the century of teaching and training dairy science students at Purdue, the focus has been on both understanding the science and being able to put into practice what was learned in the classroom. Mathematics, the biological sciences, physics, and chemistry formed the dairy science foundation. Experiences gained in the laboratory and the Purdue creamery augmented the classroom lessons in preparing students for future jobs. The curriculum incorporated class projects involving teams to stimulate problem solving and foster communication skills. The Food Science Department introduced internships in 1985 to give students practical experience prior to entering the work force. Demand for Purdue food science students remains high within the dairy and food industries.

"Preparing the Best"

PURDUE UNIVERSITY

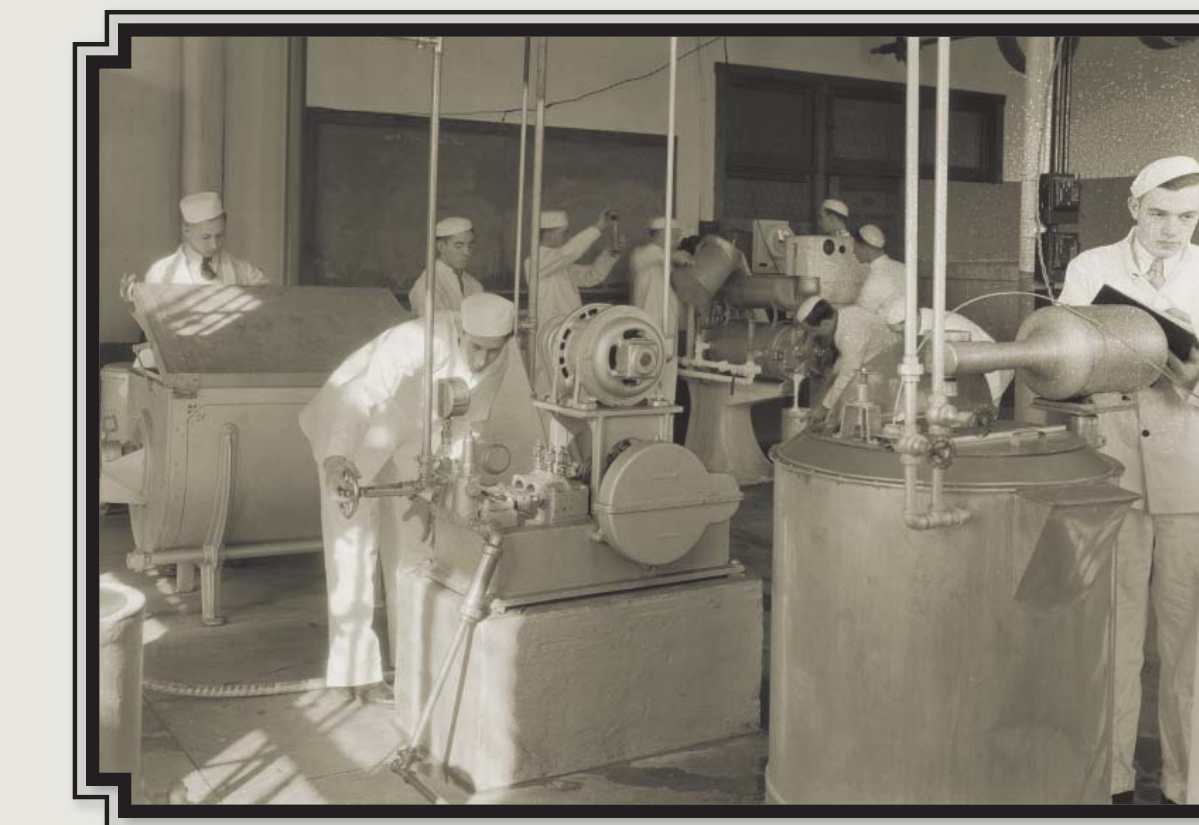


Abstract

During the organizational year of the American Dairy Science Association (ADSA), Otto F. Hunziker led the dairy program at Purdue University. A charter member of ADSA and its third president, Dr. Hunziker's brilliant career as a scientist, teacher and author is recognized throughout the world. At Purdue he provided leadership in developing educational programs to better educate dairymen. His research programs established the accuracy of glassware and provided standard methods for the Babcock fat test of milk and cream. He planned Smith Hall, which was built in 1913 to provide facilities for teaching, research and extension work. Ollie E. Reed, ADSA's 1946 Borden Award recipient, established the Purdue dairy farm in 1919 for the purpose of instruction and research in milk production and dairy herd management. From 1921-1960, Howard W. Gregory led Purdue's Dairy Department and served ADSA as president in 1937. He worked tirelessly on outreach programs, publications, training and educational services to the dairy community. Elliot H. Parfitt, whose research is well recorded in ADSA journals, served Purdue for 17 years as a dairy bacteriologist. His sanitizing protocol eventually became adopted by the Indiana State Board of Health. Another Purdue notable, Fredrick J. Babel, left a legacy of knowledge for researchers and management in the dairy food industry. His long list of teaching awards, including the 1973 ADSA Kraft Teaching Award, stands as a testimony to the excellence and popularity of this professor. The 1973 ADSA Borden Award recipient, Thomas W. Keenan, left his mark at Purdue as a biochemist with an emphasis on cell physiology. In 1983 faculties from Animal Sciences, Horticulture and Agronomy combined to form the Food Science Department, headed by Philip E. Nelson. Outreach programs, led by James V. Chambers, ADSA's 1992 DeLaval Dairy Extension Award recipient, focused on contemporary issues facing the dairy industry, such as antibiotic avoidance and municipal sewer use ordinances. During the final decade of Purdue's dairy science century, a new food science building was constructed. In 2004, S. Suzanne Nielsen became Department Head and continues to mentor the traditional successes of the Purdue University Food Science Department. Demand for Purdue food science students remains high within the dairy and food industries.



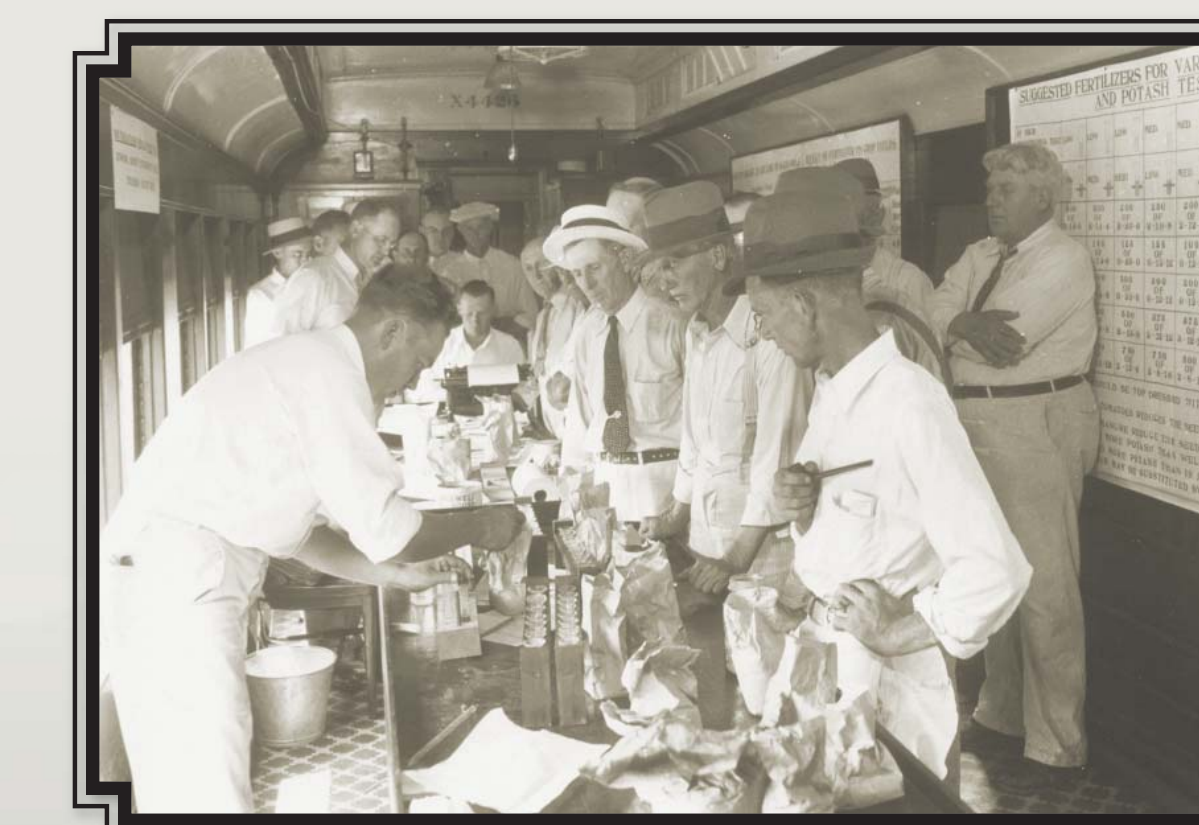
Smith Hall and adjacent creamery, completed in 1914



Students at work in the creamery



Purdue Special Dairy Train, 1914



Demonstrations inside the Dairy Train



Food Science building. Under the leadership of Philip E. Nelson, the Food Science Department grew in enrollment, faculty and national stature resulting in the construction of the new building which was occupied in the summer of 1998.

ADSA Recognition

Otto F. Hunziker , charter member, president	1910
Howard W. Gregory , president	1937
Ollie E. Reed , Borden Award	1946
Fredrick J. Babel , Pfizer Award	1961
Fredrick J. Babel , Kraft Teaching Award	1973
Thomas W. Keenan , Borden Award	1973
James V. Chambers , DeLaval Dairy Extension Award	1992

Departmental Administration

Head of Dairy Husbandry	Otto F. Hunziker	1905-1917
	Ollie E. Reed	1917-1921
	Howard W. Gregory	1921-1960
Head of Animal Sciences	Frederick W. Andrews	1960-1964
	Jake L. Krider	1964-1969
	Walter R. Woods	1969-1978
Director of Food Science Institute	Bernard J. Liska	1972-1979
	Philip E. Nelson	1979-1983
Head of Food Science Department	Philip E. Nelson	1983-2003
	S. Suzanne Nielsen	2003 -

Acknowledgements

Photographs from:

- Purdue University Libraries Archives & Special Collections
- Journal of Dairy Science
- J.C. Allen