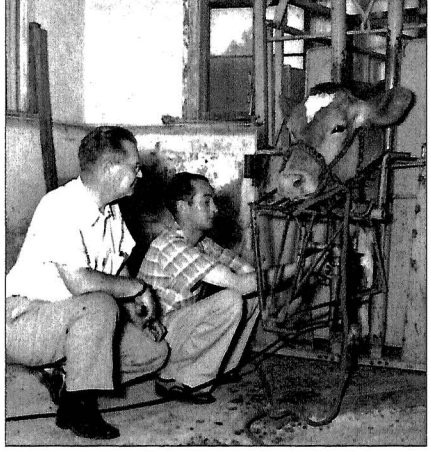
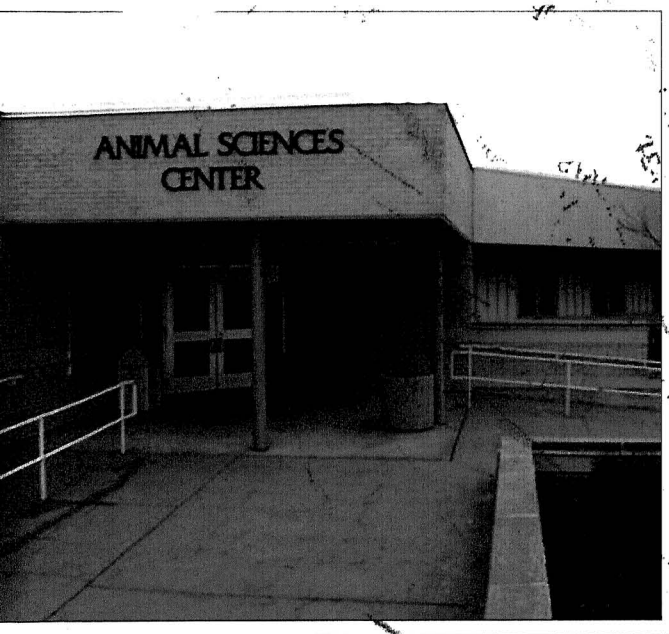
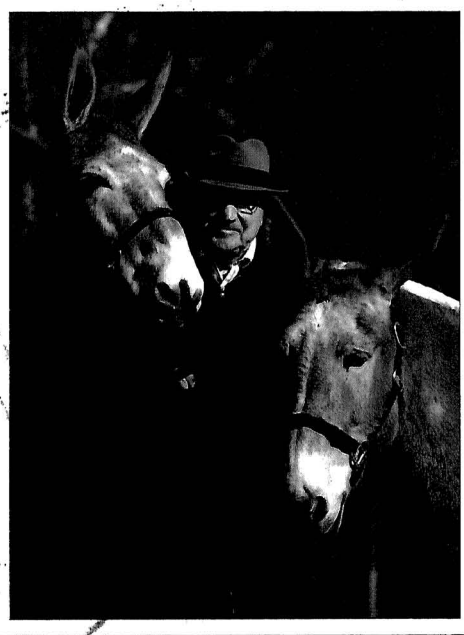
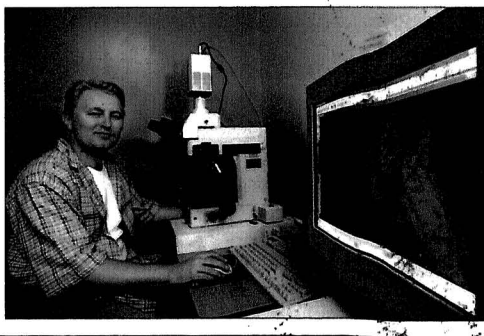


The Division of Animal Sciences

University of Missouri • 100 years







Cover photos

Top (left to right):

F.B. Mumford served as professor, department chairman and dean of the College of Agriculture. He taught some of the first animal husbandry classes in the early 1900s.

Professor C.W. Turner and a student measure the activity of the thyroid gland in a cow by monitoring thyroid uptake of radioactive iodine. Turner was an early user of radioactively labeled materials to study physiological functions in domestic animals.

Professor E.M. Funk candles hatching eggs in the 1920s to determine fertility.

Middle (left to right):

The front entrance to the Animal Sciences Research Center.

Professor Melvin Bradley had a true appreciation for Missouri's rich mule heritage. He worked with College of Veterinary Medicine mules Hilda (left) and Louise (right).

Two pigs produced by cloning are genetically identical except for an additional gene that codes for an enhanced fluorescent green protein. Expression of this gene results in a yellow color under visible light but a green color under fluorescent light.

Professor Peter Sutovsky studies sperm development and fertilization in farm animals. His research has allowed him to develop novel techniques for the assessment of fertility and semen quality in bulls, boars and stallions. His work was honored in 2005 by the first USDA National Research Initiative Discovery Award.

Bottom (left to right):

Using ultrasonography, chief animal technician Kenneth Ladyman measures fat thickness and ribeye area in a steer for student observers from the Beef Production and Management course.

Professor Mike Smith, one of the outstanding teachers in the Division of Animal Sciences, shows students the histological structures of reproductive tissues.

The Division of Animal Sciences
University of Missouri • 100 years

Special Report 564
Published April 2006

College of
Agriculture,
Food and
Natural
Resources

Missouri Agricultural Experiment Station

I want to extend a special thank-you to animal sciences professor Jim Williams for his leadership in the preparation of this document. Professors Jim Williams, Fred Martz and Joe Vandepopuliere prepared this presentation of the Departments of Animal Husbandry, Dairy Husbandry and Poultry Husbandry before they merged in 1983 and 1989. Special thanks are extended to professors George Jesse, Marcia Shannon, Al Garverick, Bill Day, Glen Geiger, Harold Biellier and Alfred Stephenson for their contributions to certain sections of this document. Professor Dick Lee devoted countless hours to editing, provided valuable advice and assisted with selecting photos and preparing captions. Jennifer L. Smith scanned photos, edited and compiled historical information from sources created by past faculty in the animal science department. Also, appreciation is extended to faculty who provided information for this document.

A special recognition is extended to professor emeritus Jim Comfort, who wrote a history of the animal husbandry department and gave it to professor Al Dyer before his death. This information was found in the University of Missouri–Columbia archives, and it enhanced certain segments of this document.

A special thanks is extended to Jim Curley, Sharon Wood-Turley, Andrell Bower and the publications staff for their professional expertise in preparing this document for publication.

This historical document attempts to capture some of the important people and events that made the Division of Animal Sciences what it is today.

Michael F. Smith

Michael F. Smith
Professor and Interim Director
Division of Animal Sciences

University of Missouri – Columbia

100 years of animal sciences

Animal agriculture has been a vital industry in Missouri for more than 100 years. In 1900, the number of cows and calves was 2.76 million and the number of pigs was 3.7 million. In 2000 the numbers were 4.35 million and 2.9 million, respectively. The number of Missouri farms in 1910 was 279,000 and in 2000 was 109,000. Missouri currently ranks second in total number of beef cows, second in number of cattle operations, third in number of turkeys and sixth in pig production.

The University of Missouri-Columbia was founded in 1839 as the first public university west of the Mississippi River. The College of Agriculture was established in 1870, and following the Hatch Act of 1887, the Missouri Agricultural Experiment Station, a collection of centers and farms for research, was established in 1888.

The College of Agriculture Departments of Dairy, Animal and Poultry Husbandry were established over a span of ten years. The dairy husbandry department was the first to form in 1901. The next to form was the animal husbandry department in 1904, and the last to form was the poultry husbandry department in 1911.

At first, each department had a manufacturing component. The Department of Food Science and Nutrition was formed in 1967, and several faculty members with expertise in animal products transferred from the three animal sciences departments into the new department. In 1983 there was a merger of the animal and poultry science departments, as well as the formation of a single undergraduate curriculum in animal, dairy and poultry science. In 1989 the animal and dairy science departments merged to form the animal sciences unit. In 2005 the name was changed to the Division of Animal Sciences.

The Division of Animal Sciences is one of the most diverse animal science programs in the U.S. and was built upon the pioneering efforts of F.B. Mumford, who had expertise in cattle feeding; C.H. Eckles, who had expertise in bacteriology and dairy production; Samuel Brody, who had expertise in energy metabolism and environmental physiology; professor A.G. Hogan, who had expertise in vitamin and mineral supplements for swine; professor H.L. Kempster, who had expertise in egg production; professor Fred McKenzie, who had expertise in reproductive physiology; and professor C.W. Turner, who had expertise in lactation and endocrinology. The current research activity ranges from the level of the whole animal to the molecular level, and emphasis ranges from problems of immediate concern to livestock and poultry producers to the development of biotechnologies that have the potential to revolutionize approaches to human medicine.

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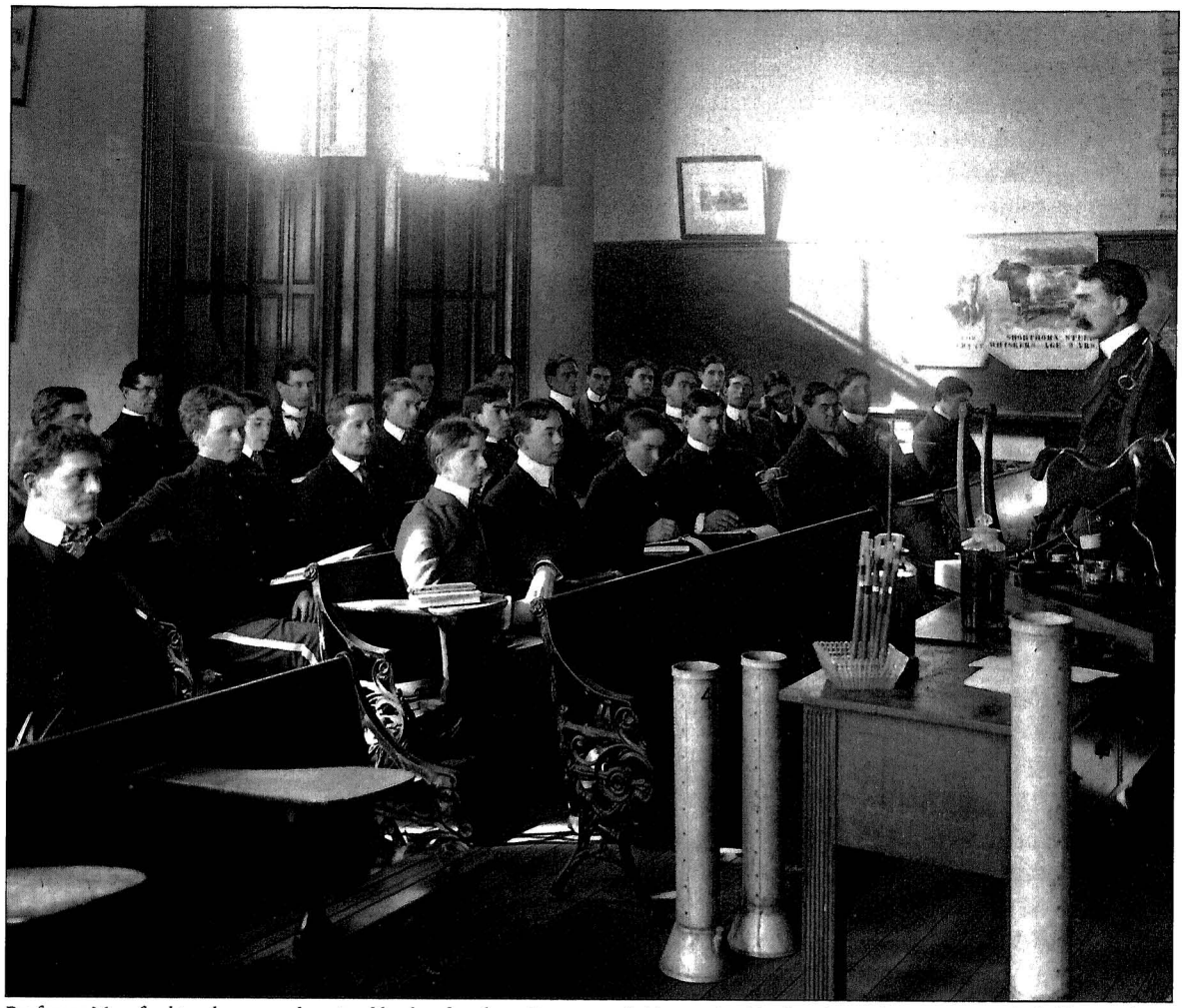


Professor Mumford teaches an early animal husbandry class. Courses available to animal husbandry students in 1904 included livestock judging; principles of feeding; principles of breeding; advanced livestock judging; beef, pork and sheep production; experimental breeding; and seminar studies.

The Department of Animal Husbandry

The Department of Animal Husbandry was established in 1904. During that time, professor Mumford served as acting dean and director of the College of Agriculture in the absence of Dean H. J. Waters. Upon Dean Waters' return from leave, Mumford again became active head of the department until 1909. In 1909, he became dean and director of the college until retirement in 1938.

Few have impacted agricultural education and research at a land grant institution as much as Mumford. During his early career as professor of animal husbandry, he wrote "The Breeding of Animals," which was a textbook published in 1920 that became the standard text in animal husbandry classes. During his short tenure as a researcher, he wrote 35 bulletins about animal breeding and production.

However, Mumford's greatest contribution (Lee, 1992) to agricultural education and research was as an administrator. Cordell Tindall, editor of Missouri Ruralist and a 1936 graduate of the college, summed up Mumford's contribution to agriculture in Missouri. He said, "Credit for building the Missouri College of Agriculture into the major institution that it is today largely goes to Dean Mumford."

Other outstanding faculty members were also influential. In 1908, E.B. Forbes was the first student to complete his Ph.D., and he helped Mumford teach livestock subjects. He later left the department to take a position at Pennsylvania State College. E. A. Trowbridge was an instructor of animal husbandry and was promoted to assistant professor in 1909. He was best known as a judge of cattle and horses. Another faculty member, L. A. Weaver, was an assistant instructor in 1910 and was known internationally as a swine judge. Trowbridge served as department chairman from 1911 to 1945, and Weaver served as department chairman from 1949 to 1957. All three had a tremendous impact on the early livestock industry in Missouri and had their portraits hung in the Hall of Farm of the Saddle and Sirloin Club in Chicago.

When the animal husbandry department was established, it became apparent that agriculture was specializing; however, it was not until 1957 that areas of specialization were established within the department. These areas were animal breeding, extension, animal nutrition, meats, physiology and production management. In 1904 most Missouri farmers raised livestock, so the department worked closely with livestock producers. This trend of working with livestock producers has continued through the years.

At first, limited funds were available for teaching and research, and most research funds were spent on production research. There was always excellent cooperation between the departments of animal husbandry, field crops and agricultural chemistry.

Facilities

Acquisition of land[1,2]

The Missouri College Farm in 1882 had 610 acres for general farming and 30 acres used by the horticulture department. Boone County donated the land for faculty in the College of Agriculture to use for teaching general farming practices and developing horticulture plots. The original intent of the University Board of Curators was that the farm would be self-supporting and generate income for the agriculture program, but the farm was in poor condition for pasture utilization and crop production. Mumford convinced the University President and board that the farm was a liability rather than an asset, which secured special funding for needed repairs of buildings and fences. In 1909 the board changed its policy regarding maintenance of the college farm, so it was developed into permanent pastures.

In 1931 the college acquired more land south of Columbia to accommodate the increase in livestock for research and teaching purposes. The first tract of land purchased was 220 acres of the Beazley farm at a cost of $14,390. The departments of field crops, soils and animal husbandry developed this land. This was a well-managed farm but was not sufficient for the large herds of livestock in the animal and dairy husbandry departments.

In 1934 the Gauss farm, a 442-acre tract of land adjoining the Beazley farm, was purchased for $12,000. This tract was divided between the animal and dairy husbandry departments and officially designated by the board as the University South Farms.

In 1936, the Missouri Agricultural Experiment Station became involved in research for swine improvement. A different area was needed for this research, so the 120-acre Johnson farm was purchased for $4,500. Other land purchases included the 82-acre Gilbert farm for $5,500, the 60-acre Rogers farm for $3,000, the 270-acre Harris farm for $7,500 and the 52-acre Bradford area for $3,750.

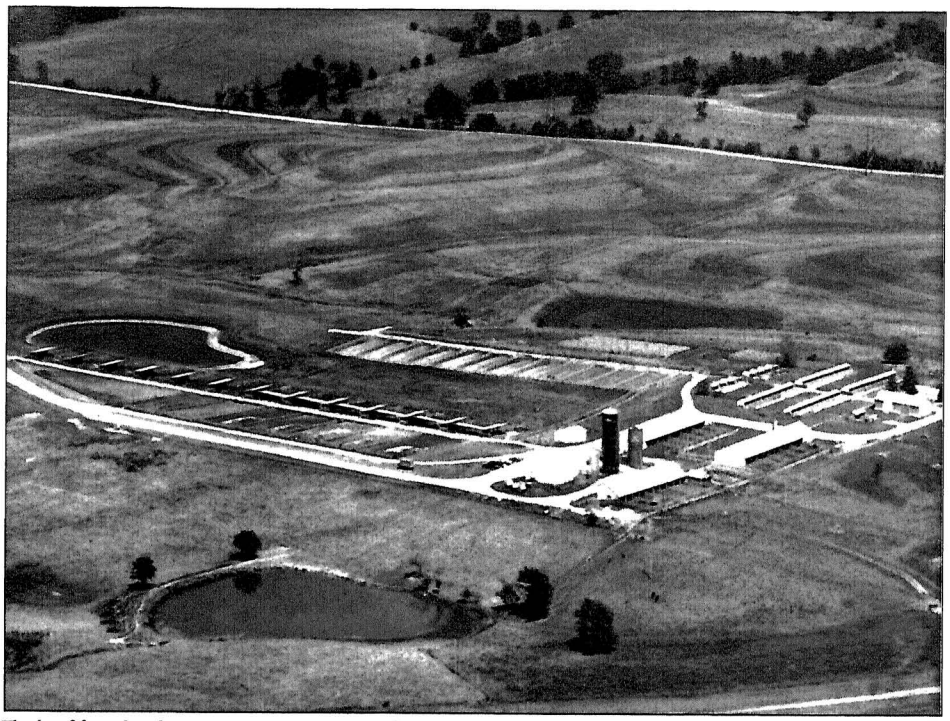
The college now had 1,246 acres of farmland located four miles southeast of Columbia, which was a prime location for teaching and research in close proximity to campus. Animal husbandry used the majority of this land for the operations of the swine, sheep, horse and beef farms as well as a feed mill built in 1965. The college of agriculture and experiment station still use this piece of land as a valuable resource for teaching and research programs. The availability of a research and teaching farm for students interested in a career in agriculture has made a difference in the quality of education received at the University.

Buildings and barns

Facilities originally available to the department were inadequate for teaching and livestock research, and farmers were disappointed with the lack of facilities for research and classroom instruction. Eventually, several barns and centers were built to relieve this problem.

The first building used by the animal husbandry department was a native

1. A great deal of information was taken from Station Bulletin 483, "History of the Missouri College of Agriculture" written by Mumford in 1944. A copy of this book is available at the State Historical Society of Missouri located off of Ellis Library on the University campus.
2. For additional information, the reader is directed to documents prepared by Professor J.E. Comfort stored with documents submitted by Professor A. J. Dyer. These boxes of material may be found at the University of Missouri Archives in 703 Lewis Hall.



The beef farm headquarters at University South Farms in 1983. The south farms, established in 1934, provided reasearch and teaching opportunities for the animal husbandry department.

limestone building built between 1901 and 1902 south of the old power plant on Rollins Street. This building had a small heated judging arena that was used until the livestock judging pavilion was completed in 1912. Animal husbandry used this building's offices and classrooms until the department moved to Waters Hall on the White Campus in 1909. The department's next move was to Mumford Hall in 1924.

Upon completion of a unit of an animal science building in 1971, some of the resident faculty involved in research relocated to this facility. This building, the Animal Sciences Research Center, was dedicated in 1983, and the animal, poultry and dairy husbandry faculty moved into the facility.

Livestock facilities[2]

One of the first buildings erected by the college was the horticulture barn and veterinary laboratory building. Built in 1887, it was located near what is presently the northeast part of Memorial Union. This building was moved once in 1904 and again to a location near Ashland Gravel Road to be used as a sheep barn until 1965.

The livestock pavilion, a wooden frame structure located at the current site of the agricultural engineering building, was built in 1914 at a cost of $25,000. It served as the site of judging contests, livestock breed association sales, workshops, University activities, tested bull sales and even research projects, which were conducted under the seating area.

A new livestock center was completed at a cost of $1.4 million in 1968. It was used for resident instruction, exhibits, shows, conferences and livestock sales. Prominent agricultural leaders who played key roles in convincing the General Assembly of the importance of such a facility to the University included Ed Stout, Harold Hackler, Bob Perry, Charles Ausfahl, Victor Gray, Col. W. E. (Gene) Smith, Keith Dunn and many other livestock producers and supporters. Professor A.J. Dyer worked closely with the committee and provided advice, encouragement and assistance in contacting key people. Stout wrote of the tremendous effort put forth by these agricultural leaders to build what was described as the "cow palace" by one legislator in Jefferson City (Stout, 1973).

A long cattle feeding shed was built between 1903 and 1904. It was 300 feet long and 30 feet wide with 15 pens and lots for feeding research cattle. Its east half later housed hogs and sheep for research. This barn was used for feeding studies for 60 years.

A cattle barn was built between 1905 and 1906. It housed cattle and horses. In 1912 the interior was rebuilt for horses. This barn was torn down in 1970, but the stone silo remained until the 1980s.

In 1923, a brick beef cattle barn was built at a location south of the University Hospital and Clinics at the corner of Stadium Boulevard and Monk Drive. The barn was the headquarters for the beef cattle breeding herd until 1961, when a new barn was erected at south farms and the brick barn was converted to a warehouse. The south farms barn is a pole barn with sheet metal siding on three sides and an open side to the south. The barn is currently designated the steer and heifer barn for beef cattle research.

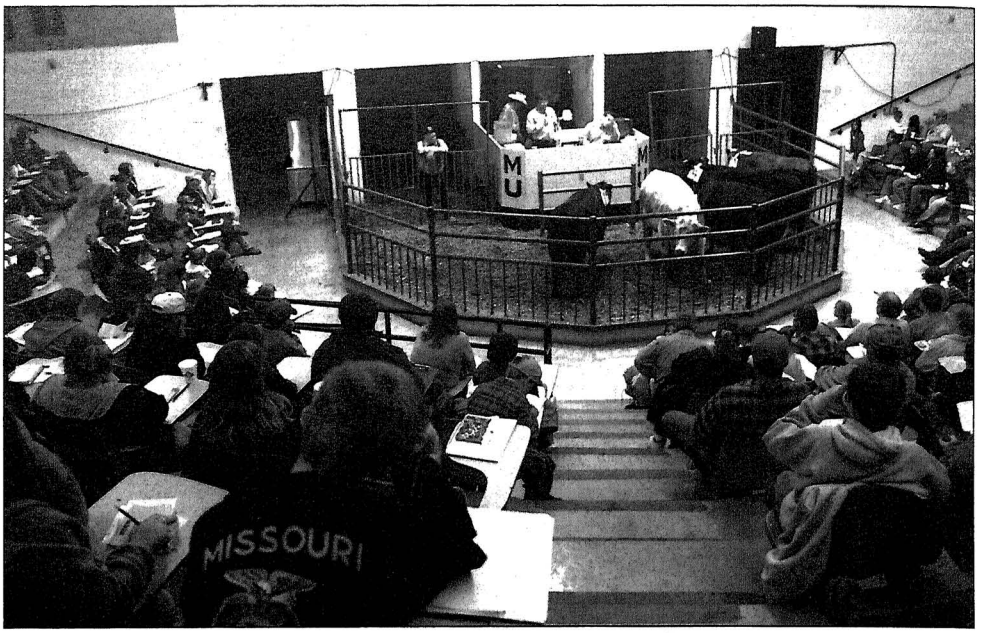
In 1936 an old barn was torn down and a central swine farrowing house with adjoining shed and feed pens was built.

In 1958 the University received appropriations for swine and beef testing stations. Keith Leavitt was the first supervisor for these improvement programs.

In 1960 two bull barns were built to be the central bull test station, which evaluated the performance of bulls for producers. In April 1975 four barns with sheet metal siding were completed at the swine farm. Located south of Sugar Grove Road, these barns were used for gestation, farrowing, nursing and finishing.

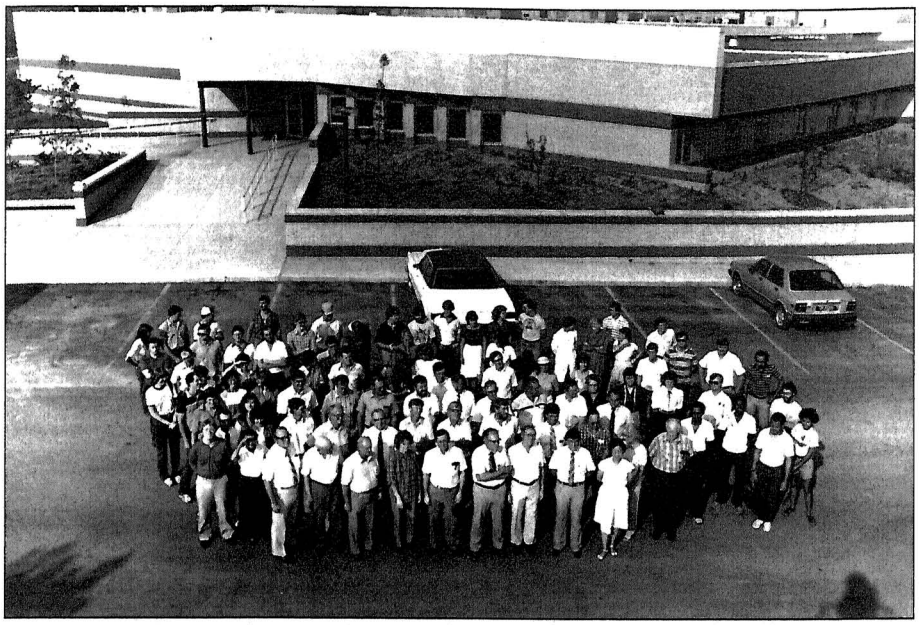
In 1992 the concrete barn was torn down, and the Creed Barn was completed in 1994. The Creed Barn was built with the gift funds received from the sale of 250 Simmental cows that were donated by Ed Creed, an MU alum. The facility has been excellent for classroom instruction of animal husbandry practices and reproductive techniques.

The livestock judging pavilion was built in 1914 at a cost of $25,000. It was located at the current site of the agricultural engineering building. The pavilion was host to judging contests, breed association sales, workshops and other University activities, tested bull sales and some research projects. A source of annoyance for visitors was the flocks of sparrows that would enter through the pavilion's many windows.
Dean Elmer Kiehl initiated efforts to build a new livestock pavilion in 1962. With the support of a long list of livestock producers, legislators, faculty and others, Trowbridge Livestock Arena was completed in 1968.



A student livestock show organized by MU and the Missouri Department of Agriculture trains youth on live animal evaluation of cattle. The show was held in the Trowbridge Livestock Pavilion, a facility for resident teaching, exhibits, shows, contests, sales and dog shows.

The long cattle feeding shed, built in 1903, was an experimental barn used for cattle, hog and sheep research. This facility was the main animal research laboratory for the first 60 years of the department and was located at the current site of Clydesdale Hall Veterinary Medical Teaching Hospital.



In 1983 the animal sciences departments came together in the Animal Sciences Research Center.

Animal Sciences Research Center

The departments of animal, dairy and poultry husbandry were formed and housed separately. Even when new facilities were constructed, the animal departments remained in separate buildings. Eventually, the study of animals shifted from a descriptive approach to a biological approach that included physiological, nutritional, genetic and biochemical processes and their complex interactions.

Advances in technology allowed refined and accurate determination of biological processes that were not previously known. Expensive new equipment and laboratory facilities were needed to take advantage of the new technology. The increasing complexity also encouraged collaboration between scientists in the same discipline or among scientists in different disciplines.

In order to meet technological demands, Dean Elmer Kiehl appointed a building committee in 1961 to plan a new facility to advance animal science research by 20 years. Professor Pfander was the chair of the committee, and other committee members were professors Boyd O'Dell, Harold Johnson, George Garner, Billy Day, Milt Shanklein and Jim Savage. O'Dell served as chairman during Pfander's sabbatical leave.

This committee put together a proposal that emphasized the strengths of 12 faculty members and included laboratory plans and an executive summary. The proposal was submitted to NIH and NSF for funding. NIH appropriated $300,000, and the Missouri Legislature provided matching support. With encouragement from Pfander, Moormans Inc. donated $500,000 to support the large animal unit.

The plan was to provide state-of-the-art laboratories that could be used jointly by individual programs and departments that could not fund equipment and facilities on their own. The new facilities would consolidate and extend superior programs and provide special units to solve important basic and health-related problems. The committee emphasized that the work should focus on important domestic animal species.

Initial construction on the center began in 1968, and section A was completed in 1971. Staff originally assigned space in Section A were from the departments of agricultural chemistry, agricultural engineering and the animal, dairy and poultry husbandry departments. Individual laboratories of this first section were built to address specialized faculty needs with adequate supporting services and mechanical equipment. The remaining units of the center were constructed over the next 12 years.

Unit B, which houses small animals, was completed in 1982. Unit C, which is comprised of environmental chambers; unit D, which houses large animals and includes a surgery unit; and unit E, which has classrooms and offices for teaching and extension faculty, were completed in 1983. Unit F, which is a metabolism building, was built at the east end when the new facilities for the College of Veterinary Medicine were constructed in 1989.

Once all units were completed, dedication ceremonies were held and the faculty and offices of the three departments were all moved into the building. Six units in the center were named for former faculty members and other individuals who had played a key role in the progress of animal agriculture in Missouri. They were A.G. Hogan, S.A. Brody, Jerry L. Litton, F.F. Mckenzie, C.W. Turner and Moorman

Presently, the facility, which now covers nearly five acres, provides the research laboratories, classrooms and offices for the research, extension and teaching faculty of the animal sciences division. The facilities at the center have been instrumental in attracting top-flight faculty members that attract external research funding from national granting organizations and industry. Over the past five years, the animal sciences division has ranked in the top two to five MU departments that obtain the most external research funding.

Research facilities

Weldon Springs Station, located in St. Charles County 30 miles west of St. Louis, was acquired from the federal government in 1948. There were 7,900 acres, of which 6,000 acres was timber. The animal husbandry, forestry, field crops and soils departments had active projects on-site. One of the projects, which was directed by Dyer, was the evaluation of the performance of cattle held in confinement under good management practices. Professor John Lasley also conducted a 10-year line breeding study project at Weldon Springs. This facility was released in 1976.

North Missouri Center at Spickard was acquired in 1955. The farm contained 1,600 acres; most of it was used for beef cattle breeding research. Associate professor Larkin Langford was the first superintendent of the center. In 1963 Lasley conducted some of the first crossbreeding studies at the center with Charolais, Angus and Hereford cows. He evaluated the impact of crossbreeding and management on reproductive performance.

A whole-body counter was completed in 1966 for the determination of lean body mass of livestock based on K40 measurements. Professors Steve Zobrisky and Ellis Graham encouraged the establishment of this facility. A great deal of research was conducted to evaluate the accuracy of K40 in predicting carcass composition in cattle, sheep and pigs. This research revealed that the technique accurately predicted body composition of beef and dairy cattle and swine but not sheep. The whole-body counter predicted the lean body mass of bulls and provided a measurement of red meat in the live animal.

Teaching

Curriculum[2]

When animal husbandry first became a department, the courses listed in the University catalog were livestock judging; principles of feeding; principles of breeding; breeds of livestock; advanced livestock judging; beef, pork and sheep production; experimental breeding; and seminar studies.

In 1908 and 1909 students in the college could specialize in one of these seven disciplines: agronomy, animal husbandry, dairying, horticulture, botany, veterinary medicine and agricultural chemistry. Students were required to complete 124 hours of required courses and 41 hours of electives for a bachelor's degree in agriculture. The curriculum for students enrolled in animal husbandry remained the same until 1935.

During the 1940s, the curriculum was modified so that all students had to complete a three-hour introductory course in each of the 11 departments of the college. This made it possible for students to become familiar with each field of agriculture. From 1946 to 1950, the curriculum was designed so that students could specialize in certain disciplines of agriculture and its related industries. In 1959 and 1964, the faculty conducted a thorough review of the curriculum and recommended extensive revision of courses. Alumni, farmers, livestock producers and representatives of agricultural businesses recommended changes as well. The curriculum changes included the following:

Group I courses

- Botany or Zoology (5 hours)
- Inorganic Chemistry (5 hours)
- Agricultural Economics (5 hours)
- Algebra 10 (3 hours)
- American Government or American History (5 hours)
- English 1 & 2 (6 hours)
- Technical Writing (3 hours)
- Public Speaking (3 hours)
- Elementary Accounting (3 hours)
- Rural or General Sociology (3 hours)
- Elementary Logic or General Philosophy (3 hours)
- General Psychology (3 hours)
- Agriculture in the Economy (3 hours)
- Electives (14 hours)

Department Chairs

Chair	Time of service
F.B. Mumford	1904-1911
E.A. Trowbridge	1911-1945
L.A. Weaver	1945-1957
Albert J. Dyer	1957-1975
W.H. Pfander	1975-1978
John F. Lasley	1978
C.V. Ross	1979
A. Max Lennon	1980
B.N. Day	1980-1981
B.D. Moser	1981-1986
George Jesse	1986-1987
Gary Allee	1987-1993
B.N. Day	1993-1995
George Jesse	1995-2001
Michael F. Smith	2001-present

Group II courses

- All electives (64 hours)

In 1967 and 1968 other revisions in the curriculum were implemented so that students could emphasize general areas of study. These areas included business, professional and science.

After 1964 minimal changes have been made to the general requirements for a bachelor's in the college. The total number of credit hours for the degree has remained at 128. Credit hours required of students from the general education areas of communications, natural science, mathematics, social science and humanities and business and economics have remained at 48 to 50 credit hours.

Like the general education requirements for the college's bachelor's degree, the departmental course requirements for the student majoring in animal husbandry, and later animal science, have remained somewhat stable in subject matter and total required credit hours during the past 40 years. In the past the department has offered students as many as four degree options in the areas of genetics, physiology, nutrition and production and management, but currently students have only one degree option.

Animal husbandry faculty 1904-1968

F. B. Mumford	1895-1938, Professor, Dean
E. B. Forbes	1904-1908, Assistant Professor
E. A. Trowbridge	1906-1948, Professor, Dean
C. A. Willson	1908-1911, Instructor
H. W. Allison	1911-1920
L. A. Weaver	1910-1957, Professor
Howard Hackedorn	1912-1919, Assistant Professor
E. H. Hughes	1914-1920, Instructor
A. G. Hogan	1920-1955, Professor
D. W. Chittenden	1919-1933, Assistant Professor
D. G. Griswold	1916-1920, Instructor
P. M. Bernard	1920-1924, Instructor
Ray E. Miller	1921-1922, Instructor
H. D. Fox	1921-1923, Instructor
G. R. Woody	1920-1921, Instructor
L. B. Mann	1920-1921, Instructor
A. R. Schenken	1920-1920, Instructor
A. T. Edinger	1921-1923, Instructor
M. T. Foster	1924-1930, Instructor
M. G. Clark	1924-1929, Instructor
F. F. McKenzie	1924-1941, Assistant Professor
J. E. Comfort	1927-1969, Professor
H. C. Moffett	1927-1938, Assistant Instructor
R. S. Glasscock	1930-1932, Instructor
Virgine Warbritton	1928-1938, Instructor
A. J. Dyer	1934-1975, Professor
Ralph Bogart	1938-1947, Instructor
H. D. Elijah	1938-1943, Instructor
F. N. Andrews	1937-1940, Instructor
V. F. McRoberts	1941-1944, Instructor
J. M. Kays	1940-1952, Assistant Professor
Glynden Easley	1940-1941, Instructor
Clarence Winchester	1940-1944, Instructor
Hubert Heitman, Jr.	1941-1943, Instructor
Dale Squires	1946-1951, Instructor
Gordon E. Dickerson	1947-1952, Professor
Preston McDaniels	1947-1948, Instructor
Zane Palmer	1948-1949, Instructor
Don R. Warner	1948-1950, Instructor
Ed R. Hauser	1948-1949, Instructor
Paul Q. Guyer	1948-1954, Instructor
Gerald C. Anderson	1948-1951, Instructor
Louisa Nelson Tucker	1948-1956, Instructor
Raymond L. Arthand	1949-1953, Instructor
John H. Landers	1949-1951, Instructor
Leland F. Tribble	1949-1967, Associate Professor
Carl Emerson	1949-1951, Instructor
J. H. Longwell	1948, Professor, Dean
K. E. Gregory	1949-1952, Instructor
Coy Brooks	1952-1954, Instructor
Gerald V. Wright	1952-1968, Instructor
C. J. Heidenreich	1953-1956, Instructor
Eugene Birmingham	1952-1960, Instructor
Rhule Sleeth	1952-1959, Instructor
A. M. Mullins	1954-1958, Instructor
W. C. Ellis	1953-1959, Instructor
R. L. Preston	1957-1969, Professor
William A. Hargus	1962-1963, Instructor
William G. Moody	1962-1964, Instructor
Charles Stufflebeam	1960-1965, Instructor
Jack L. Clark	1964-1977, Associate Professor
Robert L. Macy	1965-1967, Instructor
William E. Meyer	1965-1966, Instructor
Ron L. Warner	1965-1967, Instructor
Charles H. Long	1966-1967, Assistant Professor
Albert Waite	1966-1967, Instructor
John J. Matz, Jr.	1967-1969, Assistant Professor
Vernon Witte	1966-1967, Instructor
Wesley W. Crenshaw	1968-1982, Associate Professor
Larken Langford	1964-1985, Associate Professor
Joe A. Sagebiel	1968-1970, Assistant Professor
Glen L. Richardson	1968-1971, Instructor
S. T. Simpson	1912-1922, Assistant Instructor
W. H. Rusk	1921, Assistant Instructor
H. M. Garlock	1920-1932, Assistant Professor
R. L. Waddell	1920-1924, Assistant Professor
D. A. Spencer	1921-1920, Assistant Professor
Sam F. Russell	1924-1927, Assistant Professor
J. W. Burch	1923-1962, Professor
E. S. Matteson	1935-1962, Professor
T. A. "Bill" Ewing	1928-1959, Assistant Professor
William E. Pugh	1955-1958, Associate Professor
Sam S. Rowe, Jr.	1949-1953, Associate Professor
Frank Dillard	1946-1948, Assistant Professor
Charles R. Kyd	1943-1951, Associate Professor
Jack G. Riley	1963-1965, Assistant Professor

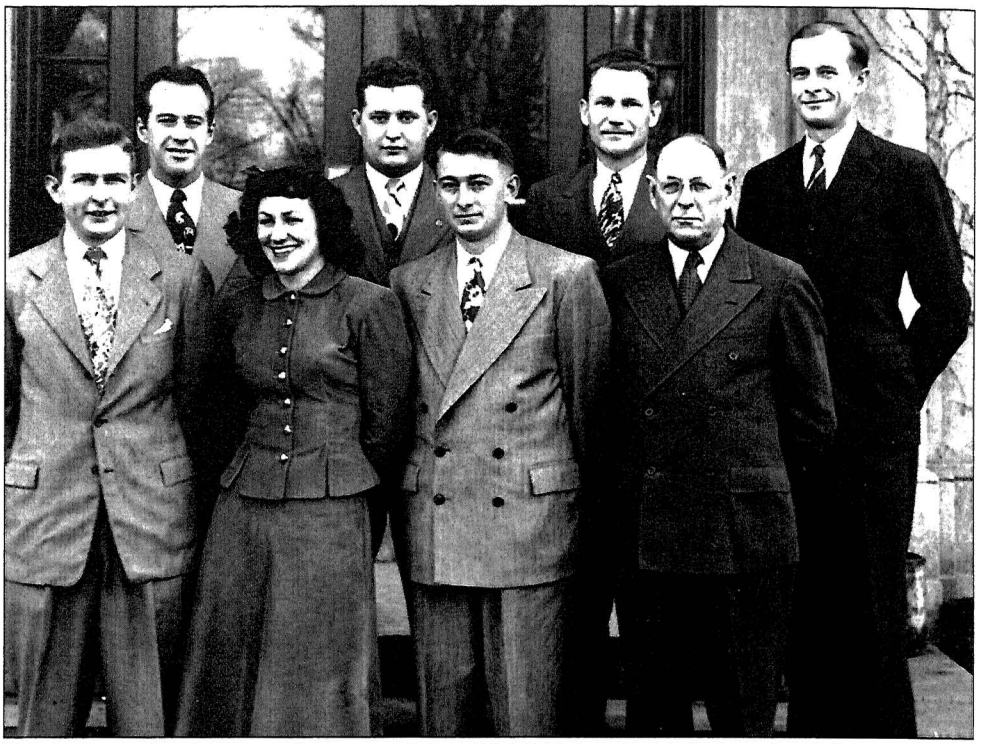
Students are currently required to complete courses in nutrition, breeding, production and management just as students were in 1904. During the past 10 to 20 years, the course work in animal science has emphasized science and deemphasized husbandry. Another change has been to encourage students to participate in off-campus internships, study abroad and conduct undergraduate research.

Livestock judging team

According to The College Farmer in 1910, Forbes coached the first MU livestock judging team in 1905. The following statement taken from this article is still true today: "The making of a place on the judging team means hard work and some sacrifice in time and money. However, it is safe to say that men who have been members of the teams have never had reason to regret the time and money spent. The experience gained by the meeting of the best breeders of purebred live stock, the association with stock men and the acquaintances formed with other college students and instructors is compensation which cannot be disregarded."

Missouri entered a team in the first intercollegiate livestock judging contest at the International Livestock Show in Chicago in 1905, and MU has competed in following contests except for those that took place during World Wars I and II and the outbreak of foot and mouth disease.

David Kemp, the current team coach, said, "These young men and women are dedicated ambassadors for the University of Missouri and represent a positive aspect of today's youth that is all too often forgotten."



The 1948 livestock judging team. Bottom row (left to right): Ed Schwitzky, Marie Cervenka, Arthur Ewing and Professor L.A. Weaver, department chairman. Top row (left to right): John Hall, Logan Heathman, Melvin Bradley and A.J. Dyer (coach). This was the first team with a female participant.

The 1996 livestock judging team: (left to right) Susan Shroyer, Dennis Toedebusch, Keenan Switzer, Dale Holtmeyer, Dale Riley, Nick Hammett, Phillip Kleiboeker and Kyle Rozeboom (coach).

Block and Bridle

The MU Block and Bridle Club was organized in the fall of 1912 and became a national organization in November 1920 at the International Livestock Exposition in Chicago. Student representatives of animal husbandry clubs from Iowa State University, Kansas State University, University of Missouri and University of Nebraska formed the National Block and Bridle Club. Each chapter collaborated on a constitution and a statement of club objectives. These objectives are to promote a high scholastic standard among students of animal science, promote livestock raising, create a better understanding among animal science students at various colleges and universities and to foster closer relationships among men and women pursuing an animal science profession.

The first National Block and Bridle president was J.U. Morris, who graduated from MU in 1921 and became a state extension specialist. Melvin Bradley was national vice president from 1959 to 1960 and national president from 1960 to 1961. Dyer was national secretary from 1949 to 1950. The official colors of Block and Bridle are royal purple and navy blue. The official flower is the lilac.

The MU chapter of Block and Bridle holds two meetings each month.

MU livestock judging team

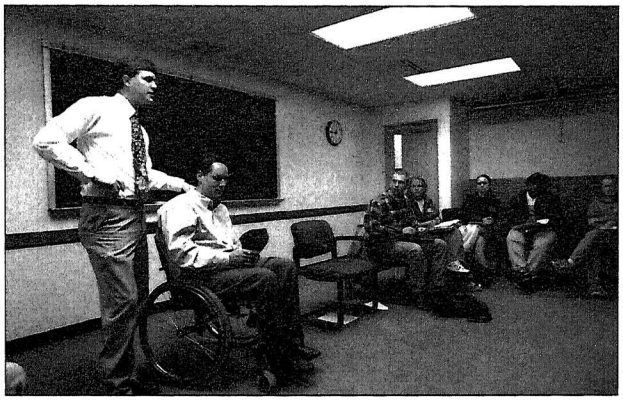
Year	Members (team coach is noted by *)
1905	C.B. Hutcheson, E.W. Rusk, H.P. Rusk, C.G. Starr, T.W. Woodward and E.B. Forbes*
1907	Turner C. Cochran, M.G. Coe, W.R. Cockefair, D.H. Doane, S.D. Dow, Morris Field, Edward Rodekohr and E.A. Trowbridge*
1908	W.L. Fowler, H.P. Griffin, H.E. McNatt, E.C. O'Neil, T.R.H. Wright, and E.A. Trowbridge*
1909	H.H. Hackedorn, C.M. McWilliams, John E. Ryland, B.P. Smoot, L.A. Weaver and E.A. Trowbridge*
1910	T.R. Douglas, W.R. Heckler, S.T. Simpson, George S. Templeton, Walter S. Williams and E.A. Trowbridge*
1911	T.R. Haden, R.L. Hill, E.C. King, W.T. Wasel, H.F. Williams and E.A. Trowbridge*
1912	F.L. Bentley, James Douglas, M.D. Gordon, W.T. Magee, James Smith and E.A. Trowbridge*
1913	J.W. Arnold, Charles Caldwell, Carl Gillispie, R.P. Royce and H. Hackedorn*
1916	J.B. Alford, R.E. Miller, I.F. Nichols, Russell Wilson, J.H.Wright and H. Hackedorn*
1917	Ira Dryman, R. Knotts, J.H. Longwell, O.E. McConnell, M.N. Witt and L.A. Weaver*
1919	P.M. Bernard, H.F. Messick, J.U. Morris, M.F. Scott, P.M. Vandiver and L.A. Weaver*
1920	W.T. Angle, W.R. Rippey, Charles Skouby, W.R. Streeter, John Wallace and L.A. Weaver*
1921	W.P. Hays, H.R. Klein, W.M. Nicoson, Frank Stonner, T.C. Wells and L.A. Weaver*
1922	E.C. Elting, Harold Hanser, H.M. Hunt, Elmer Knipmeyer, Owan McCammon, R.E. Uhland and L.A. Weaver*
1923	C.B. Makin, C.R. Meeker, J. Miller, C.R. Thompson, O.R. Tripp and L.A. Weaver*
1924	R.J. Laughlin, C.S. Maddox, John W. Riley, C.H. Statton, J.S. Williamson and L.A. Weaver*
1925	R.B. Baker, A.H. Bennett, J.E. Comfort, R.D. Hockensmith, M.F. Rushton and L.A. Weaver*
1926	W.C. Bute, J.F. Davis, R. Rodgers, L.M. Turk, R. Vadnais and L.A. Weaver*
1927	A. Adams, Joe Grant, J.C. McLean, E. Schmid, Ira Thornton and Don Chittendon*
1928	V. Burks, A.J. Dinsdale, G. Ensminger, L.P. Hopper, K.L. Turk and Don Chittendon*
1929	R.E. Hargrave, Jack Martin, E.E. Smith, H.M. Smith, John Wilson and Don Chittendon*
1931	John Dickerson, Justin Doak, Kenneth Evans, John Falloon, Eugene Lee, Cletus Swackhamer and D.W. Chittenden*
1932	Albert Dyer, B.W. Harrison, J. Houghton, Don Spalding and E.A. Trowbridge*
1934	Albert Hagan, Paul Meyer, Kent Riffie, James Scamman and Charles Williams*
1935	Jewett Fulkerson, Vernon C. Jelley, Robert Kaye, Alva Mix, Homer Thieman, Claude Willett and H.C. Moffett*
1936	J. Batt, Spencer Dakan, H.J. L'Hote, R. Lentz, R. Mills, Harold Thieman and H.C. Moffett*
1937	Martin Baugher, Frank Blakemore, Clyde Brown, Marshall Heck, Vincent Hunt, Robert McClurg, Aubrey Pulliam and H.C. Moffett*
1938	Harry Barger, Gordon Blackmore, James Harness, Dave Mitchell, Sam Rowe, Maurice Springer and H.D. Elijah*
1941	Ovid Bay, Don Burros, Dudley Carson, James Dunlap, Allyn Engle, Don Warner and A.J. Dyer*
1946	Harold Hammer, Ward Harrington, Clifford Redman, Emmett Walker and A.J. Dyer*
1948	Melvin Bradley, Marie Cervenka, Jesse Lee Dowdy, John Hall, Jim Heitmeyer, Jerry Meinke, Ed Rinner and A.J. Dyer*
1949	Leo Cronin, Donald Mansfield, Leroy VanDyke and John Kays*
1950	Keith Byergo, Reuben Edwards, George Mitchell, Marshall Pile, James Rutter, G.B. Thompson, Edward Tietsort, Kent Walker and Melvin Bradley*
1951	Van Eitel, Paul Guyer, Bud Hertzog, Jerry Johnson, Karl Marks, Max Mason, Herschel McNeel, Bill McWilliams, North Pile, John Russell, John Summitt, Wendell Walker and Melvin Bradley*
1952	Jack Bennett, Russell John, Clarence Mabee, Bob Perry, Bill Riley, Gus Rutledge and Melvin Bradley*
1953	Herald Clizer, James Delaney, Nick Iman, Charles McPheeters, Robert Roth, L. Dean Ketchum, William Shideler and Melvin Bradley*

MU livestock judging team

Year	Members (team coach is noted by *)
1954	Gene Forsyth, Bob Gibson, Jerry Jeffrey, Bill King, Bill Shideler, Jim Thiel, Charles Webster, Milton Yeary and Melvin Bradley*
1955	Jerry Buell, Jim Cook, Larry Dingus, Don Foster, Kieffer Lehman, Armand Moles and Melvin Bradley*
1956	Don Estep, Quentin Greenley, Don Johnson, Cleo Kottwitz, Don Mobley, Harold Raasch, Jack Rhoades and Melvin Bradley*
1957	Jim Boillot, Bob Doak, Ron Dozier, Byron Simpson, Joe Stewart, Wyley Wyatt and Melvin Bradley*
1958	Matt Alexander, Kendall Anderson, Bob Bricker, Don Carter, Gordon Cox, Harold Dickson, Melvin Karr and G.B. Thompson*
1959	Gene Anderson, Howard Beckemeyer, Norman Braksick, Jim Gibbs, Fred Good, Doug Johnson, Jim Russell and G.B. Thompson*
1960	Everett Forkner, Dwayne Garrett, Bob Harriman, Les Middleton, Al Paul, Neal Schnarre, Leon Scrutchfield and G.B. Thompson*
1961	Eldon Cole, Mike Denslow, Gerry Farris, John Harrison, Jack Riley, Orville Vorhis, Morris Westfall and G.B. Thompson*
1962	Henry Deal, Jim Foster, Arnold Gatson, Jack Harriman, Norman Marriott, Elizabeth Moore, Ron Warner, Larry Wilson and G.B. Thompson*
1963	Dow Anderson, Judy R. Dever, Paul Gibbs, Robert Lefturch, Wally Ginnis, James E. Reynolds, Ivan Rush, John Saunders, Terry Warner and G.B. Thompson*
1964	Carl Gerhardt, Hugh Haden, Jim Morris, Jim Powell, Jim Thorne, Duane Timm, Warren Wolf and G.B. Thompson*
1965	Gary Allee, Terry Hedeman, Tom Houghton, Albert Kennett, Jerry Link, Jack Powell, John Romann and Ron Warner*
1966	Mike Cravens, Mike McKee, James D. Munson, John Paul, Robert A. Rowles, Keith Schnarre, Max Sell, Melvin Sickendick and G.B. Thompson*
1967	John Roy Chipman, LeRoy Davis, George Jesse, Charles Kirk, David Maupin, John E. Powell, Glenn Ridder, Tom Stallings, Olan Stemme and G.B. Thompson*
1968	Jack Breuer, Ben Coleman, Ed Flehmer, John Hagans, Roger Parker, Ron Rottmann, Gerry Shinn, Terry Taylor and Glenn Richardson*
1969	Don Birk, Wayne Deneke, Roger Eakins, Jerry Fox, Bill Holt, Jim Kinder, Ken McCutcheon, Paul Meier, Craig Stemme and Glenn Richardson*
1970	Terry Holt, Don Kleiboeker, John Lackey, Danny Lewis, Duane Sicht, Steve Volker, John Williamson and Glenn Richardson*
1971	Don Arnsperger, Stan Bell, Jim Bolte, Ken Ryan, J.D. Rudasill, Steve Suthoff, Larry Turner, Paul Walker, David Wenger and Don Birk*
1972	Gary Baumann, Jim Berger, Pat Buckman, Larry Forkner, Dale Hawkins, Ron Ketchem, Jim Peck and Jack Kreider*
1973	Paul Brandt, Jim Dugan, Tom Farrington, Gary Flehmer, David Mannigel, David Middleton, Randy Powers, Winston Simpson, David Smith and Greg Martin*
1974	Dennis Branstetter, Jay Carlson, Mike Johnson, Kurt Kysar, Lyle Lomas, Paul Martin, Stephen McBee, John Northcutt, Mike Ray, Mike Rutter, Wayne Shannon, Jeri Lynn Sloan and Greg Martin*
1975	Gary Dolan, Jim Edwards, John Edwards, Brad Forkner, Mike Kasten, Larry Kerbs, Rader Miller, Tom Morris, Jeff Windett and Greg Martin*
1976	Doug Ayers, Roger Bennett, Diana Bruns, Max Curtis, Dan Derrick, Carl Johnson, Steve Jones, Mike Korte, Marty MacDonnell, Joe McBee, Jay Purchase, John Walker, Bob Warren, Rich Witten and Greg Martin*
1977	Dave Ficken, Perry Klossner, Tim Lackey, Larry Martin, Mike McCroy, Frank Raasch, Darrell Ragland, Randy Rodgers, Mike Schrewsbury, Mark Smith and Greg Martin*
1978	Bill Bowman, Jim Harmon, John Iman, Scott Kennedy, Russell Kremer, Alisa Marsden, Bill Nation, Debbie Page, David Rains and Mike Katusch*

MU livestock judging team

Year	Members (team coach is noted by *)
1979	Chuck Blaschke III, Gail Boles, Greg Clifton, Chuck Hall, Don Laughlin, Jim Perry, Ron Russell, Teresa Sudsberry and Ross Hamilton*
1980	Charles Chapuis, Steve Edwards, Jack Ficken, Nathan Martin, Ross Page, Gary Slater, Witten, Kevin Yaeger and Ross Hamilton*
1981	Steve Bricker, Dennis Cappel, Sherry Coats, Chuck Gue, Kristie Kincaid, Jane Page, Scotty Shannon, Trent Tieman and Ross Hamilton*
1982	Kirk Bellis, Doug Boillot, Warren Boles, Mike Coale, Stan Coday, Bruce Crutcher, Sammy Dickeson, Lesa Holland, Dwight Lindley, Toni Middleton, Judy Moore, Roy Ragland, Connie Ulrey, Shari Warner and Jerry Lipsey*
1983	Randy Alewel, Craig Bacon, Jon Borgman, Greg Brandhorst, Celia Harmon, Brent Highfill, Greg Martin, Dean McKibben, Roy Middleton, Lisa Mergen, James Sappington, Doug Stark, Jay Voelsmeier and Jerry Lipsey*
1984	Kevin Allison, Brian Duke, Tim Erickson, Bruce Fowler, Lance Gabriel, Wes Kemp, Chris Mountjoy, Greg Reynolds and Jerry Lipsey*
1985	Greg Choate, Steve Disselhorst, Adam Gatson, Mike Henderson, Jody Leer, Curtis Long, Carol Nagel and Jerry Lipsey*
1986	Kim Bailey, Matt Boatright, Shauna Coon, Ernie Ehlers, Doug Frank, Leslie Fullerton, Darrell Gittings, Alan Kapp, Dean Middleton, Duane Robertson, Jeff Thompson, Jon Tiemann and Jerry Lipsey*
1987	Todd Clevenger, Kevin Fennewald, Brian Gittings, Elisabeth Huff, John Juergensmeyer, Kathy Reynolds, Jeff Schoen, Greg Townley and Jerry Lipsey*
1988	Tom Anderson, Jonna Coats, Sally Diederich, Anita Geddes, Sherri Heisey, Shannon Holohan, John Jurgensmeyer, Ralph Nelson, Mike Powell, Randy Rosenkrans and Jerry Lipsey*
1989	Les Anderson, Chris Byrd, Russell Coon, Steve Duame, Ken Dissselhorst, Rick Disselhorst, Carl Watson and Jerry Lipsey*
1990	Tricia Cobb, Shelly Duame, James Dotson, Shea Gentzsch, Cecil Harness, Kyle Kessler, Susan Neuenschwander, Lance Rains, Brian Reed, Tim Riley, Monty Smith and Jerry Lipsey*
1991	David Alexander, Aaron Atkins, Scott Cowger, Dennis Fennewald, Rob Homeyer, Todd Roberson, Jarey Royer, Chris Shoen, Glen Waters and Marty Ropp*
1992	Melissa Barcome, Kevin Duncan, Roger Erickson, Beth Parker, Susan Waters and Marty Ropp*
1993	Ryan Bailey, Steve Dotson, Robert Elijah, Sam Funk, Matt Heldt, Cindy Rademan, Dan Schroeder, Melissa Suttles, Chad Triplett and Marty Ropp*
1994	Jeff Berkemeyer, Heath Eckler, Stephanie Gable, Douglas Gooding, Chris Henderson, David "Chip" Kemp, Rochelle Nelson, Brian Sifers, Sharla Stewart and Jerry Lipsey*
1995	Ronnie Akers, Gretchen Bruffett, Matt Caldwell, John Kleiboeker, Jeff Klein, Tiffany Klein, Brad Toedebusch, John Wheeler and Jerry Lipsey*
1996	Nick Hammett, Dale Holtmeyer, Phillip Kleiboeker, Dale Riley, Susan Shroyer, Keenan Switzer, Dennis Toedebusch and Kyle Rozeboom*
1997	Brad Fahrmeier, Ryan Hulse, Mark Lehenbauer, Jason McBee, Kevin Owen and Kim Staggs*
1998	Ryan Hulse, Travis Lathrop, Kevin Owen, Kelly Rojas and Eric Farrand*
1999	Jeff Dalby, Chad Copenhaver, Travis Lathrop, Leon Legleiter, Curt Rogers, Justin Swindler and Eric Farrand*
2000	Jeremy Cobb, Camissa Jarboe, Travis Kramme, Lance Thompson and Jeff Dalby*
2001	Matt Brandt, Julie Christopher, Amanda Dyke, Mike Jennings, Brian Sneed, Lance Thompson, Lori Thompson and Jeff Dalby*
2003	Jessica Bartholomew, Andrew Branstetter, Crystal Buckner, Michael "Patrick" Davis, McKenzie Keedy, Michele Koelling, Cody Tebbenkamp and David Kemp*
2004	Darren Loula, Andrea Loyd, Greg Meier, Luke Miller, Kyle Nelson, Megan Perry, Brett Sayre, Travis Thies and David Kemp*



Top: Professor Jim Spain and Sen. Chuck Graham address sophomore animal science students in a seminar. Spain is one of the outstanding animal science professors.
Right: Jennifer Lincoln, John Ritter and Jana Norman compete in the 1999 Academic Quadrathalon. The winners represent the University at a regional animal science meeting.

Members invite guest speakers, such as registered and commercial livestock producers, representatives of breed associations and representatives of all phases of agribusiness. Many successful MU graduates who have been farming or raising livestock have presented informative talks on their operations. These meetings present an opportunity for students to visit with speakers and ask questions.

In the 1920s members formed committees that assisted with fitting and showing livestock for the short course judging contest, which was held during the winter. The committee that performed the best fitting and showing job received an award. When the short courses were discontinued in 1933, the club began sponsoring the Little International. The purpose of the Little International was to supplement regular course work by providing a practical means of education and experience in fitting, showing and evaluating livestock.

Currently, the club averages 80 members from the college's various degree programs. The club has won several national awards for chapter activities, including a first-place win in 2004. The local chapter hosted the national convention in St. Louis, Mo, from Jan. 17-21, 2001.

Present and previous chapter activities include an annual banquet with awards, a junior steer and heifer show, a Little American Royal contest, a quarter horse show and a stock dog clinic. Among the presented awards at the annual banquet is the livestock person of the year award. Recipients have their photographs displayed in the sale area of the Trowbridge Livestock Center.

Livestock Person of the Year

1969	A. Ruben Edwards	1986	Jim Ross
1970	Jerry Litton	1987	Maurice Alexander
1971	Everett Forkner	1988	Homer B. Sewell
1972	Robert N. Perry	1989	Roland (Pig) Paul
1973	Lewis and Harold Thieman	1993	Jack Rhoades
1974	Ed Stout and W.E. Smith	1994	John Rea
1975	A. J. Dyer	1995	Eddie Sydenstricker
1976	Marshall McGregor and Gerald M. Sandidge	1996	Sheri Spader
		1997	John Saunders
1977	John and Betty Rotert	1998	Wayne Yokley
1978	Glenn Klippenstein	1999	Jerry Lipsey
1979	John F. Lasley	2000	B.N. Day
1980	Byron G. Simpson	2001	Lowell Mohler
1981	John W. Massey	2002	Richard Spader
1982	Edwin Schwitzky	2003	Charles Rosenkrans
1983	Ricky Hopkins	2004	Wayne "Doc" Smith
1984	Melvin Bradley	2005	Eldon Cole
1985	C. Robert Hinds		

Enrollment and teaching costs[1]

The enrollment in the animal husbandry department in 1904 and 1905 was 180 students. The next year enrollment was 205. The animal and dairy husbandry departments experienced a steady increase in enrollment. In 1972 enrollment in animal sciences was 382; in 1981 it was 438, and in 1993 it was 380. In 2004, 356 students were enrolled in animal sciences.

During the past decade, female student enrollment in animal science has reached 70 percent. Seventy percent of the animal science majors come from a non-agriculture background, and over 90 percent of these students hope to become veterinarians. Currently, a big challenge is recruiting young people with a sincere interest in production agriculture.

Meats judging team

Year	Members
1948	Donald Block, Arthur W. Ewing, Jr., Harold M. Dunn, Don Naumann and J.E. Comfort (coach)
1950	Gordon Walsh, Normal Pick and Carl Emmerson (coach)
1951	James "Ike" Barry, David Cowger, Ruben Edwards, Richard Binder, Charles Dittmar, Carl Heidbreder and H.D. Naumann (coach)
1952	Chris Gerhard, Charles Dittmar, Ed Deatherage and H.D. Naumann (coach)
1953	Gene Motley, Robert Perry, Jim Thiel and R.L. Henrickson (coach)
1954	Robert Gibson, Larry Dingus, Joe Issacs and R.L. Henrickson (coach)
1955	Jack Jones, Walter Ruesch, Jack Rhodes and H.D. Naumann (coach)
1956	Jim Boillot, Don Buback, Roger Bowness, Glenn Martin and H.D. Naumann (coach)
1957	Roger Alewel, John Hanes, Lowell Mohler, Dale Pasley, John Wayant and H.B. Hedrick (coach)
1958	John Hardlicea, Joe Jurgensmeyer, Robert Hughes, F. C. Parrish and H.B. Hedrick (coach)
1959	Lee Downing, Eddie Stanek, James Marcum and H.B. Hedrick (coach)
1960	Roy Russom, David Kern, Gerald Faris and H.B. Hedrick (coach)
1961	Elizabeth Moore Coon, Ron Warner, Norman Marriott, Tom McDowell and H.B. Hedrick (coach)
1962	John Saunders, Morris Bilskie, Wally McGinnis and H.B. Hedrick (coach)
1964	Albert Kennett, Hugh Haden, Jimmy Powell and H.B. Hedrick (coach)
1965	Ken Cartwright, Lee Murphy, Carl Gerhart, Ron Venable, William Stringer (coach) and Richard Epley (coach)
1966	LeRoy Davis, Glenn Ritter, Bob Zeysing, J.C. Douglass, Olin Stemme, William Stringer (coach) and Richard Epley (coach)
1967	Benny Coleman, Lawrence Heitmeyer, Danny Keith, Ron Utterback, Ken Eagan, Jim Hodges, John Ralls, Ed Woods, William Stringer (coach) and Richard Epley (coach)
1968	Gary Broughton, Wayne Korte, Fred Vahle, Jerry Fox, Kraig Stemme, Alan Volker, William Stringer (coach) and Richard Epley (coach)
1969	Paul Davenport, Billy Streeter, Tom Reichert, Billy Smith and Richard Epley (coach)
1970	Dan Delong, John Rudasill, Richard Nutter, Ralph Eagan and William Stringer (coach)
1971	Dan Dedrick, Maurice Eagan, Bob Lock, Allen Douglas, John Lackey and William Stringer (coach)
1972	Dan Benne/Bennett, Larry Herring, Gary Linnenbringer, Gary Flehmer, Bill Huhman, Larry Purvis and Allen Douglas (coach)
1973	Kurt Kysar, Wayne Shannon, Roy Parsons and Jeri Sloan
1974	Greg Mallory, Connie Houghton, Donald Knehans and Mike Coats
1975	Roger Bennett, Joseph McBee, John Wallace, Carter Heitmeyer and Jay Purchase
1976	Dave Ficken, Larry Martin, Mike Shrewsbury, Timothy Lackey, Darrel Ragland and Tim McConnell (coach)
1977	Charles Boles, Martin Butler, Zane Klein, Debbie Page, Bill Bowman, John Iman, Alan Ogden, David Rains and Tim McConnell (coach)
1978	Greg Clifton, Richard Marsh, Arlene Vehlewald and Gail Boles
1979	Gary Slater, Steve Allen, Jack Ficken, Mitch Hale, Kevin Yeager, Steve Edwards, Charles Chapuis, Mike Day, Ron Russell, Nathan Martin and Dave Jones (coach)
1980	Dale Braungardt, Dennis Cappel, Christie Kincaid, Scottie Shannon, Steve Bricker, Chuck Gue, Jane Page, Bill Vaughn, Dave Jones (coach), Ron Russell (coach) and Sam Godber (coach)
1981	Kirk Bellis, Warren Boles, Toni Middleton, Randy Paul, Doug Boillot, David Mathes, Roy Ragland, Connie Ulrey, Ron Russell (coach) and Sam Godber (coach)
1982	Randy Alewel, Greg Brandhorst, Bren Highfell, Roy Middleton, Craig Bacon, Celia Harmon, Dean Mell, Kevin Stonum and Sam Godber (coach)

Meats judging team	
Year	Members
1983	Margaret Anderson, Clarence Finchum, Junior Holman, Greg Reynolds, Jane Ann Boles, Jill Frisbee, Kevin Huebner and Ken Cable (coach)
1984	Greg Choate, Adam Gatson, Mike Henderson, Gary Robertson, Larry Ficken, Terry Greiwe, Chuck Long, Carol Nagel, Ken Cable (coach) and Jane Ann Boles (coach)
1985	Matt Boatright, Doug Frank, Darrell Gittings, Gina Kleeman, Brian Spears, Shauna Coon, Leslie Fullerton, Alan Kapp, Fred Pohlman and Ken Cable (coach)
1986	Todd Clevenger, David Orf, Greg Townley, Elisabeth Huff, Kathy Reynolds and Greg Choate (coach)
1987	Bob Bagnell, Shannon Hollahan, Mike Holding, J. Turner and Greg Choate (coach)
1988	Russell Coon, Stephen Daume, Susan Neuenschwander, Tamera Potts, Shelley Daume, Julie Myers, Julie Parks, Alan Stille and Kevin Fennewald (coach)
1989	Brian Reed, Lance Rains, Ben Caruthers and Kyle Kessler
1990	Scott Coger, Mendy Walch, Glen Waters, Melaney Oberdahlhoff, Tony Washburn and Greg Choate (coach)
1992	Beth Parker, Keith Rodamacker, Charla Stewart, Patrick Kussman, Cindy Rademan, Missy Barcome, Robert Smith and Steve Dalme (coach)
1993	Doug Gooding, Tiffany Klein, Julie Sager, Brandyn Triplett and Jeff Berkimier
1994	Jeff Klein, Keenan Switzer, Joel Spencer, Chris Streck, Bart Becker and Jared Nowack
2001	Craig Diebold, Aaron Bolte, Lizzi McClellan-Wilkinson, Amanda Volt, Patrick Davis and Gregg Rentfrow (coach)
2002	Luke Miller, Tracy Northcutt, Jessica Bartholomew, Crystal Buckner, Angela Lemon and Gregg Rentfrow (coach)
2003	Matt Ryan, Jeff Anderson, Gary Albertson, Nicki Brown and Gregg Rentfrow (coach)

The financial allocation for teaching began at $5,000. This covered expenses for supplies and laboratory equipment. As enrollment increased between 1904 and 1938, the allotment of money for teaching did not increase. The lack of support for education of students has always been a major issue. As dean, Mumford addressed this problem in an article published in The College Farmer in 1921 titled "New College of Agriculture." He said, "The college as a whole received increasingly larger appropriations from each session, but the funds have gone to few enterprises. At this time, the major one was extension. When one factors in the increasing support for buildings, the amount of money available per student for teaching has increased very little in the past six years."

Due to a reallocation of college funds, animal sciences did recieve more money for teaching. From 1997 to 2001, the average appropriation for teaching was $47,315. By 2004, the allocation increased by 32 percent.

Frederick B. Miller trust fund

In 1980 the Frederick B. Miller Trust Fund was established with proceeds from the sale of an excellent 1,000-acre farm Miller had willed to the animal science department. Several extension faculty and Jim Heitmeyer were instrumental in discussing Miller's wishes to provide financial assistance to students and improve agriculture in Missouri. The funds have been primarily used for graduate and postdoctoral fellowships, undergraduate scholarships, specialized research and extension activities. Since 1986, these funds have supported 34 master's and 27 doctoral students and 14 postdoctoral fellows, as well as 57 undergraduate scholarships of $1,000 and numerous internship programs for undergraduate students.

Extension

1904 to 1980[2]

The extension movement got its start with the farmer's institute and agricultural trains. These events carried information from the experiment station and leading farmers to other farmers throughout the state. Missouri was the first to use a demonstration rail car for lecturing and demonstrating new technology. This method greatly improved the spread of information to farmers. This new way of communicating agricultural information became popular and was adopted by surrounding states.

In 1912 the board approved the extension service that had previously been used by the college, and Missouri's first county agent attached to the University was hired. Mumford helped develop the proposal that was presented to Congress and eventually led to the formation of the United States Department of Agriculture Cooperative Extension Service.

One of the pioneer extension specialists in Missouri was professor James W. Burch, who was born in Linn County in 1893. He was appointed county agent of Callaway County in 1921 and served as director of extension from 1935 to 1959. He developed and guided the Balanced Farming Program that became nationally and

Extension got its start with the farmer's institute and agricultural trains. Extension faculty would travel by train throughout the state to teach about genetics, nutrition and crop production. One of the popular exhibits was Josephine, the Holstein cow with the world record for milk production.

Top: John Sam Williamson, James W. (Jim) Burch and Harry S. Truman at a Missouri 4-H event, at which Truman was the featured speaker. Burch was a well-known county agent and state livestock extension specialist and became director of the UM Agricultural Extension Service. Williamson was a former Missouri agriculture commissioner, University curator, local farmer and strong supporter of the livestock industry.

Left: Jim Ross shows a lamb to children at a youth event. During the 1960s and 1970s, Ross initiated statewide clinics, short courses and seminars for beef cattle and lamb producers.

internationally recognized. Balanced farming programs were implemented on more than 25,000 family farms in Missouri and highlighted the best-use practices for the land, labor, equipment, livestock, buildings and capital.

Another outstanding contribution by extension specialists to Missouri's livestock industry was the development of cooperative feeder pig and feeder calf sales in rural areas of the state. Professor E. S. Matteson played a major role in the success of these sales. These sales enhanced the quality of pigs and cattle produced in these areas as well as encouraged the development of leadership in the operation of the cooperative sales.

In the 1970s two-day swine farrowing schools became very popular and were taken to all counties in the state. This program was initiated by professor Leroy Rottman in the agricultural economics department and implemented by professor John Rea in animal husbandry. Two of the instructors for these schools were Lois Phillips and Rosemary Harris. The schools became very popular and soon were initiated in other states.

The schools were called feminine farrowing schools because they were attended by women who managed the pigs on the farm. When the producers and their wives attended these schools, the wives were taught the latest skills in castration, cutting needle teeth, ear notching and docking, and nutrition, breeding and veterinary practices were also taught.

Specialists also initiated programs for purebred breeders on measuring loin eye area and fat thickness.

In 1958, the Missouri Beef Cattle Improvement Programs were initiated by professor Homer Sewell and later coordinated by professor John Massey. This resulted in development of the Missouri Performance-Tested Bull Sale Program. In 1959, the General Assembly appropriated funds to erect testing facilities at the south farms. The bull test station evaluated the performance of purebred bulls fed and managed under the same environmental conditions. This was an excellent educational tool to demonstrate genetic differences between bulls managed under similar conditions. Traits measured were daily gain and feed conversion as well as carcass merit on a steer herd mate.

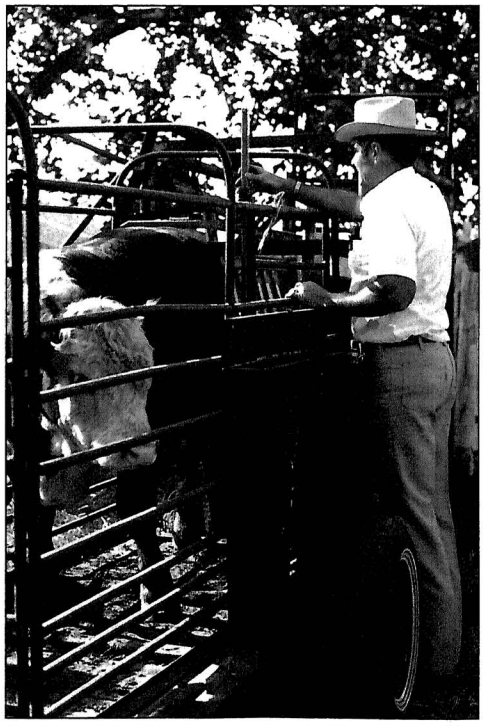
The testing program provided every livestock producer an opportunity to take part in measuring productivity of his or her herd. With the cooperation between state and area extension specialists, Missouri became a leader for performance testing programs that tested from conception to carcass. Although steady growth in adoption occurred over the past 10 years, the majority of beef cattle breeders did not maintain adequate preweaning and postweaning records.

Good prices for bulls sold in the first state-tested bull sale in 1963 prompted interest in extension's testing program. The program encouraged more seed stock and commercial cattle producers to weigh, measure and track cattle. In 1972 frame score was first assigned to bulls in the sale, and the sale that year also saw voluntary estimates of fat-free body taken by a whole body radiation counter.

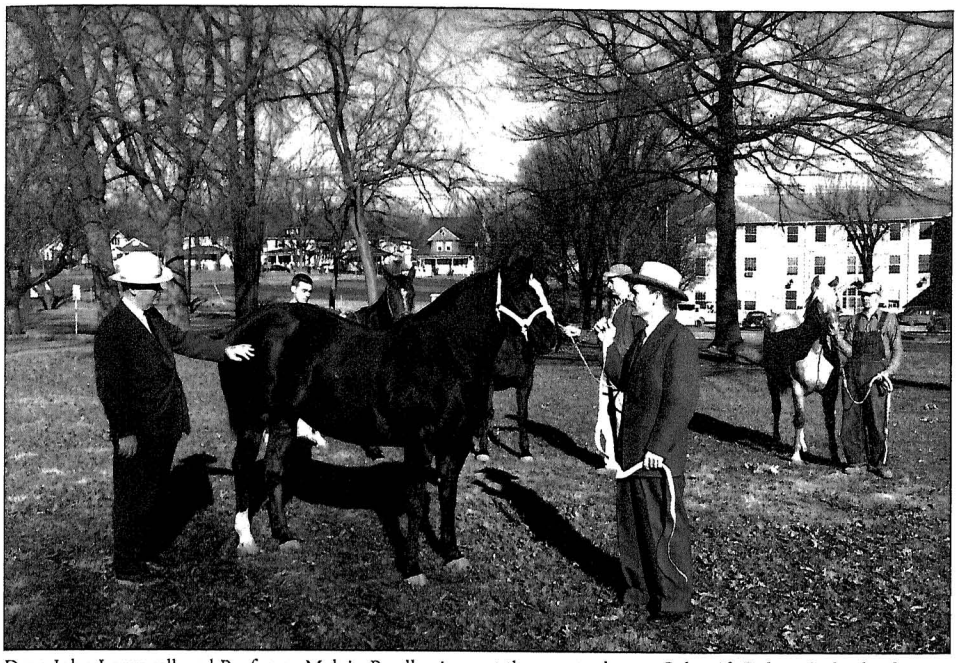
The performance-tested bull sales continued to generate interest and enthusiasm from commercial and purebred breeders throughout the 60s. The success of the bull sales encouraged breeders to test their bulls through the extension program. This program impacted the Missouri beef industry more than any other program at that time. During a 20-year span beginning in the early 70s, the frame score of feeder cattle went from 3.5 to almost 6, which is equivalent to an increase of 150 pounds in live weight.

Extension faculty 1912-1965

S.T. Simpson	1912-1922, Assistant Instructor
W. H. Rusk	1921, Assistant Instructor
H. M. Garlock	1920-1932, Assistant Professor
R. L. Waddell	1920-1924, Assistant Professor
D. A. Spencer	1921-1920, Assistant Professor
Sam F. Russell	1924-1927, Assistant Professor
J. W. Burch	1923-1962, Professor, Director of Agricultural Extension
E. S. Matteson	1935-1962, Professor
T. A. "Bill" Ewing	1928-1959, Assistant Professor
William E. Pugh	1955-1958, Associate Professor
Sam S. Rowe, Jr.	1949-1953, Associate Professor
Frank Dillard	1946-1948, Assistant Professor
Charles R. Kyd	1943-1951, Associate Professor
Jack G. Riley	1963-1965, Assistant Professor



Professor John Massey measures the frame score of a Hereford bull as part of the Missouri performance-tested bull sale program.



Dean John Longwell and Professor Melvin Bradley inspect the quarter horse, Coley Al. Robert Sutherland donated quarter horses to the University in 1956. Coley Al was the grand champion gelding at the Fort Worth Stock Show and the American Royal that year.

Professor C.V. Ross and Jack Rhodes, sheep farm manager, show Hampshire wethers. Ross was dedicated to ensuring sheep had a place in Missouri agriculture. One of his favorite sayings was, "You just have to keep working to get people to accept sheep. It's just like a battleship...If you keep pushing at the anchor, it will eventually move."

In the 1960s and 1970s, Sewell implemented a two-day cattle feeding seminar and a one-day state cattle tour to showcase current applications of nutrition and management practices. These events highlighted practices of successful cattle feeders and back grounders as a way of providing solutions to current problems of beef cattle producers. During this same period, extension specialist Jim Ross initiated statewide clinics, short courses and seminars for beef cattle and lamb producers. These efforts improved percentage of calf crop, weaning weights of calves, percentage of lamb crop weaned and percentage of ewe numbers, as well as increased crossbreeding practices in the state.

1980 to the present

The beef extension programs that were previously successful were continued throughout the state in the 1980s. This effort consisted of taking information to the producers and field representatives through formal group meetings, on-site visits, printed materials and field trials. The overall goal was to provide beef cattle producers with proper management practices that could increase profitability.

The continuation of performance-tested bull sales increased the value of feeder calves. Discussions of the advantages of crossbreeding and its implementation in the herd also added value to feeder cattle. The state cattle tour, Hampton Feedlot study, implant field trials and dissemination of supplementation strategies for cattle grazing fescue were key programs. Other programs well-received by cattle producers were the Four-State Beef Conference, state cow and calf clinic and integrated resource management.

In 1987 the commercial agriculture program was funded by the state legislature. Professor Rex Ricketts, former chairman of dairy science, was chosen to direct the program. The commercial agriculture faculty worked with the state extension specialists to develop and deliver programs that improved profitability and sustainability of agricultural enteprises.

Associate professors K.C. Olson, Eric Berg, Carol Lorenzen, Vern Pierce and Bob Larson participated in a beef focus team. The programs designed and delivered by the team impacted the Missouri beef industry through the improvement of feeding, management and marketing practices.

The Premier Beef Program was initiated to educate small-herd beef producers in the concept of value-based feeder-calf marketing and to institute regional feeder-calf marketing alliances.

Another important program was the Missouri Beef Audit, which consisted of an analysis of the competitive position of Missouri's beef industry. This

program attempted to identify the elements that determine value in the beef industry and describe how those value drivers may change in the future. A Web site was developed for producers to use to identify systems, strategies and economic opportunities that could help them become competitive in the beef industry.

In 1996, the Show-Me-Select Replacement Heifer program was established by professor Dave Patterson and became the first statewide, on-farm beef heifer development and marketing program in the nation. The program provided a reliable source of quality replacements, increased marketing opportunities and added value to Missouri-raised heifers. As of 2004, 519 farms across Missouri had enrolled 61,061 heifers in the Show-Me-Select program.

Producers participating in the program use available technologies for on-farm beef heifer development that are now spilling over into cowherds in the state. The program has stimulated a significant increase in interest and use of estrus synchronization and artificial insemination.

In the 1980s the main focus of the swine extension program was to educate and service large and small commercial swine producers, seedstock swine producers, allied industry and youth. The major emphasis was placed on improving ration formulation, evaluating the cost effectiveness of alternative feeds, improving herd health, measuring pork value and improving breeding programs and reproductive efficiency. The extension program used Swine Day, research reports, seedstock seminars, carcass evaluation, feeding trials and an integrated resource management program to accomplish its objectives.

In the 1990s the swine extension program took on new leadership under the direction of associate professors Tim Safranski and Marcia Shannon. One segment of the program provided research information that could enhance nutrition and feeding practices of swine producers.

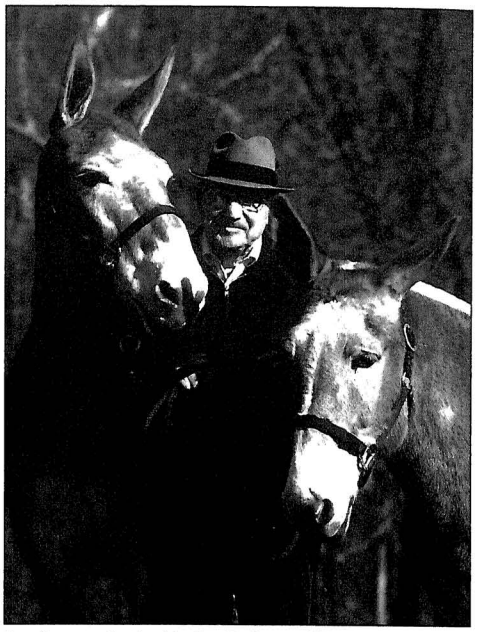
Program administrators worked with regional livestock specialists, Missouri swine producers, Pork Producers Association members and members of the MU commercial agriculture swine focus team. Administrators visited producers to provide on-farm nutrition, management and feed milling advice.

Extension faculty members have also worked closely with the Missouri-based feed industry. This effort has provided unbiased nutritional information about products and dietary specifications for independent producers and the Sho-Me Buying Cooperative.

Another goal of the extension program was to improve reproductive efficiency of Missouri swine farms and enhance efficiency of genetic programs. One attempt to accomplish these objectives was through the on-farm testing program for the Missouri Swine Improvement Association. A state extension specialist supervised the extension associate appointed to operate the on-farm testing program, and regional extension faculty remained involved in all programs to ensure their access to needed information.

The on-farm testing program led to the establishment of high-level training in reproductive management. The training, which attracts participants from around the country, includes an annual two-day program in artificial insemination and farrowing management. Shorter training programs were also presented throughout the state. Farm consultation was also a key part of the program.

In the 1980s the sheep industry in Missouri consisted of approximately 120,000 sheep from 3,900 farms. In the 1990s the number of sheep was reduced by 30,000 and 500 fewer farms had sheep. The main focus of the sheep extension program has been to educate and assist producers and consumers with questions regarding the sheep industry.



Bradley worked with the College of Veterinary Medicine to purchase Hilda and Louise, a popular mule team campus- and state-wide. Bradley's two-volume book, "The Missouri Mule: His Origins and Times," continues to be in high demand. More than 100 were sold between July 2004 and June 2005.

The faculty members responsible for the program included Jim Ross and professors Duane Keisler and Helen Schwartz from Lincoln University.

The main program extension used to accomplish its goal was the Missouri Sheep Conference, which began in the 1950s. Between 200 and 400 producers attended this program to discuss key topics facing the sheep industry. Other programs were the sheep shearing schools, lambing workshops, youth showing and fitting clinics and on-farm tours.

In 1989 Keisler initiated the sheep reproductive management and artificial insemination clinic. The clinic provided about 45 producers with advanced training in sheep reproductive management. A handbook was developed for this program. The sheep flock devoted to the teaching program was discontinued for financial reasons in the summer of 2000.

In the 1980s, the horse population in Missouri was estimated at 220,000, and horses contributed over $300 million to the gross national product. Because of the legalization of pari-mutuel wagering on horse racing, the number of breeding and training horses was expected to increase in the state.

The faculty members responsible for the extension program were professors Melvin Bradley and Wayne Loch. The programs included in-service training of extension personnel, increasing youth proficiency in skills related to horses and providing a knowledge base to local extension staff in the areas of horse nutrition, reproduction and growth and development. The faculty educated many producers and youth through the horse owners short course each year. The horse judging seminar educated exhibitors and judges of current horse judging standards. A total of 285 representatives from 23 states attended this event.

Extension programs have continued to educate the youth about horse judging and the scientific and technical aspects of horse production and management. In 1981 Bradley published the book "Horses: A Practical and Scientific Approach." He later published a two-volume book, "The Missouri Mule: Its Origins and Times."

The 1990s saw a growing interest in horse ownership among 30- to 40-year-olds who were anxious to obtain knowledge of leisurely horse riding. Loch organized a Missouri horse celebration, in which 4,000 horse-riding enthusiasts attended seminars on riding, feeding and caring skills.

The poultry industry continued to grow through the 80s and 90s. The annual value of commercial eggs , broilers and turkeys increased from $80 million to $200 million by 1998.

Professors Joe Vandepopuliere, Glenn Geiger and Jeffre Firman have initiated extension programs to address a variety of poultry areas. One area addressed was turkey and broiler litter, which was investigated to determine its use as fertilizer and ruminant feedstuff. Another area was pest and external parasite control through the use of impregnated plastic strips and rechargeable plastic tubes used in the cage. Other programs have emphasized performance quality factors associated with eggshell strength, animal skeletal defects and animal growth rate in commercial production units. The 4-H incubation and embryology programs and the FFA poultry judging program directed toward youth have been successful. The main goal for the turkey program was to increase information exchange between the University and industry and conduct applied research beneficial to turkey production in the state.

In the 1990s programs were initiated in extrusion processing that would produce quality feedstuffs from agricultural byproducts. Extrusion processing was used to produce pathogen-free products for the poultry industry. Another program produced fertilizer and feedstuffs by composting on-farm dead birds in the right facilities with the right procedures. A third program continued youth poultry education and training. Jesse Lyons devoted considerable effort to this area of emphasis. The program worked with The National FFA Organization and was involved in judging contests. An annual program about hatching chicks in the classroom has reached between 80,000 and 90,000 youths each year.

Research

1904 to 1980

Meats teaching and research was first conducted in the Department of Agricultural Chemistry and was later transferred to the animal husbandry department. Professor P.F. Trowbridge became chairman of the agricultural chemistry department in 1907; he taught chemistry, as well as conducted research in the meat science area.

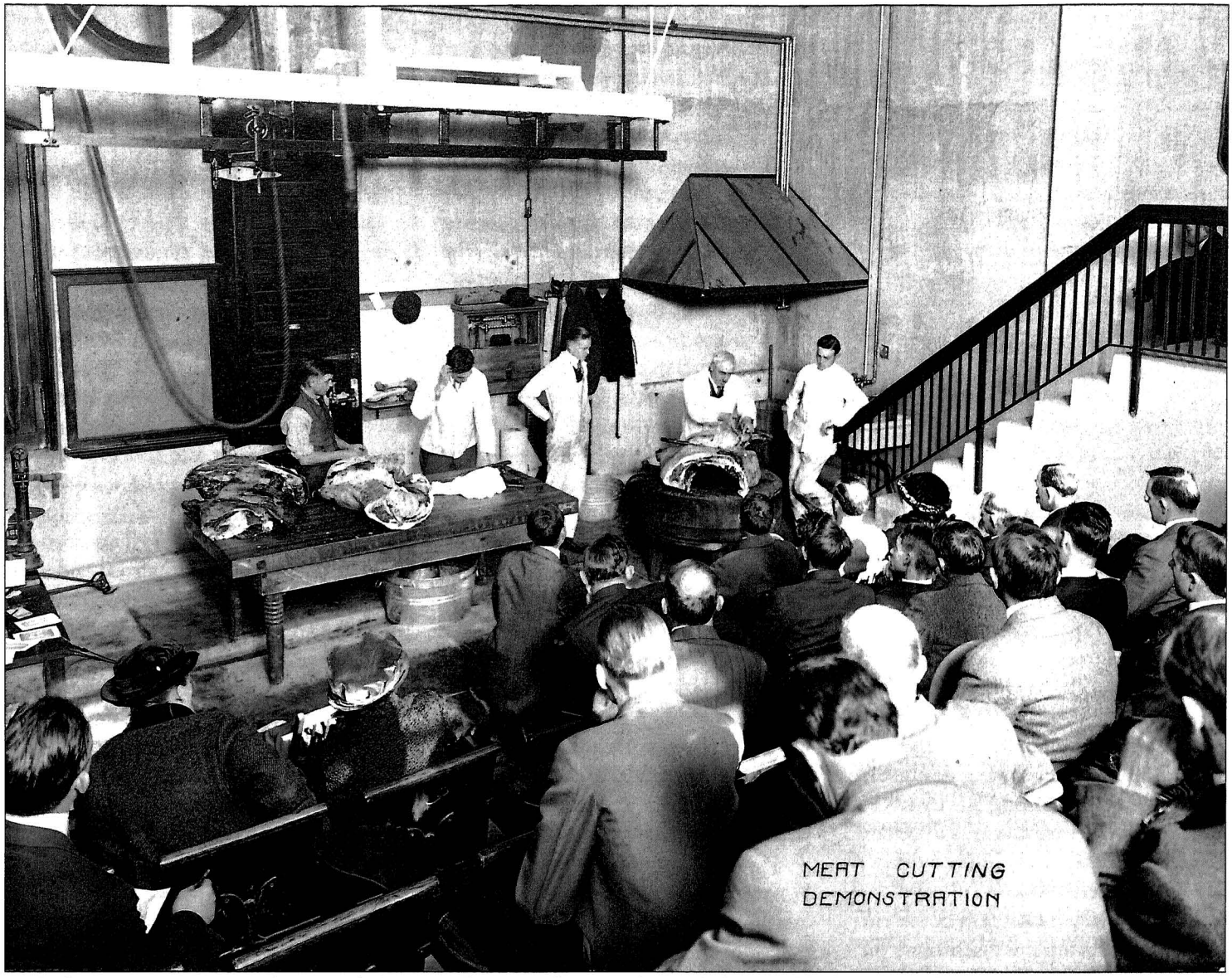
The first meats research, which began in 1907, greatly expanded knowledge of the influence of nutrition and age on body composition of cattle. An initial study in this line of research was the use of food experiment. This study determined the impact of growth rate during each period of a steer's life on the rate of fat and lean deposition in tissues. A second project examined the effects of retarded growth in young cattle that were restricted in nutrient intake on mature conditions at the end of a later period of full feed. Both studies lasted over 14 years. These were the first studies to receive national and international recognition for investigating the influence of nutrition and age on body composition of beef cattle.

Before 1920, most studies in the department focused on developing feeding programs for livestock. The swine research focused on grain feeding in dry lot, green forage feeding and supplementing corn. Other studies focused on corn for fattening steers, silage feed for horses and mules, corn and oats for mules and rations for breeding ewes. From 1920 to 1940, nutritional studies continued to evaluate grain sources as swine feed and rough rice for fattening cattle, sheep and swine. Studies also focused on developing swine pastures.

Professor A.G. Hogan, a pioneer in the field of animal nutrition, got his start in the animal husbandry department in 1920. He served as professor of animal nutrition, and for 32 years he served as chairman of the agricultural chemistry department. One of his greatest contributions to new knowledge in nutrition was recognition of folic acid as a B vitamin and development of an assay method for its isolation and identification (House, 1973).

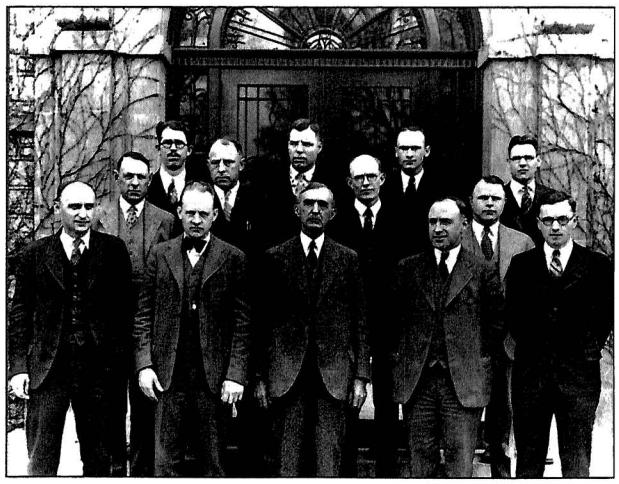
Professor Fred McKenzie (Mayer, 1973) initiated reproductive physiology research in the department. He started his research studies on the fundamental processes underlying reproduction in farm animals in the late 20s and early 30s. McKenzie, graduate students and other scientists were pioneers in the production and application of methods used in artificial insemination and in research that furthered the knowledge of the physiology of reproduction in farm animals. McKenzie's research effort is the foundation for the nationally and internationally recognized reproductive physiology group active in the department today.

Lester Casida was a graduate student under McKenzie from the University



Faculty demonstrate meat cutting techniques in the basement of Switzer Hall in 1921. This was the location of the first slaughter facility.

Professor Don Naumann shares information on the meat type hog at an Agriculture Day exhibit in the livestock pavilion in the early 1950s.



Agriculture faculty. Bottom row (left to right): Jim Burch, Jim Foster, F.B. Mumford, E.A. Trowbridge and Fred F. McKinsey. Middle row (left to right): L.A. Weaver, T.A. Ewing, A.G. Hogan and Don Chittanden. Top row (left to right): L.E. Cassida, Harry Garlock, Hubert Moffett and J.E. Comfort.

of Wisconsin whose research career had a major impact on reproductive physiology. McKenzie and his students made extensive investigations of semen from boars and rams and used elegant surgical techniques for their many anatomical investigations of the reproductive tract of these animals.

McKenzie collaborated with investigators in other departments and at other institutions, which was unusual at the time but laid the foundation for the current collaborative research spirit.

From the 1950s to the 1990s, reproductive physiology research continued under the direction of professor Bill Day, whose research concentrated on estrus, ovulation, fertilization and early embryonic development in swine. He conducted basic studies to determine factors affecting the maintenance of pregnancy with emphasis on the role of the corpus luteum during early gestation. Current faculty members in the department continue to make significant contributions to reproductive physiology.

Before 1950, facilities for meats research and teaching consisted of a meats laboratory and refrigeration rooms in the agricultural chemistry building. A small frame building designated as a dairy facility served as an abattoir. In 1952 a new abattoir and laboratory facilities were built.

When professor D.E. Brady joined the department in 1948, the program expanded to include six courses in meat science and an active research program. From 1950 to 1960, eight faculty members with expertise in meat science were hired, which reflected the importance of meat science as a research and teaching program.

Their research areas included how much fat is acceptable in the carcasses of cattle, hogs and lambs to be used as meat, how lean a carcass can be without compromising flavor, how forage impacts the flavor of meat and how stress influences dark cutters.

In 1967 the meat science program transferred to the food science and nutrition department, but the faculty members in both departments continued to work closely.

In the 1950s, Pfander joined the department. His research program covered the areas of swine nutrition at different ages and stages of development, ruminant digestion and metabolism, mineral nutrition and biochemistry of nitrogen utilization. He contributed greatly to our knowledge of the fate of nucleic acids in ruminant metabolism and the influence of nitrates in food and water.

In the 1960s the department conducted a great deal of nutrition research. Investigators continued to look at the nutrition of swine at different ages and stages of development. Professor Leland Tribble discovered that the use of antibiotics in brood sows at breeding time increased the litter size, reduced energy intake and generally improved sow performance. For ruminants, digestion and metabolism, mineral nutrition, biochemistry of nitrogen utilization, metabolic disorders and ration toxicity were key areas of research. In sheep, the research focused on calcium requirements of the ewe and creep feeding studies with lambs. In beef cattle, the work was directed toward protein supplements, grain and daily nutrient requirements.

In the 1970s significant research contributions occurred on several fronts. Researchers determined potassium requirements of sheep, nutrition requirements of the neonatal pig, prediction equations for fat-free body weight of cattle and swine, the value of confinement facilities for beef cattle and maximum usage of roughage and pasture in the production of finished cattle. One of the significant research areas directed by Lasley was the impact of crossbreeding of beef cattle on expression of reproductive traits with an emphasis on genotypic X environmental interactions.

Food for the 21st Century

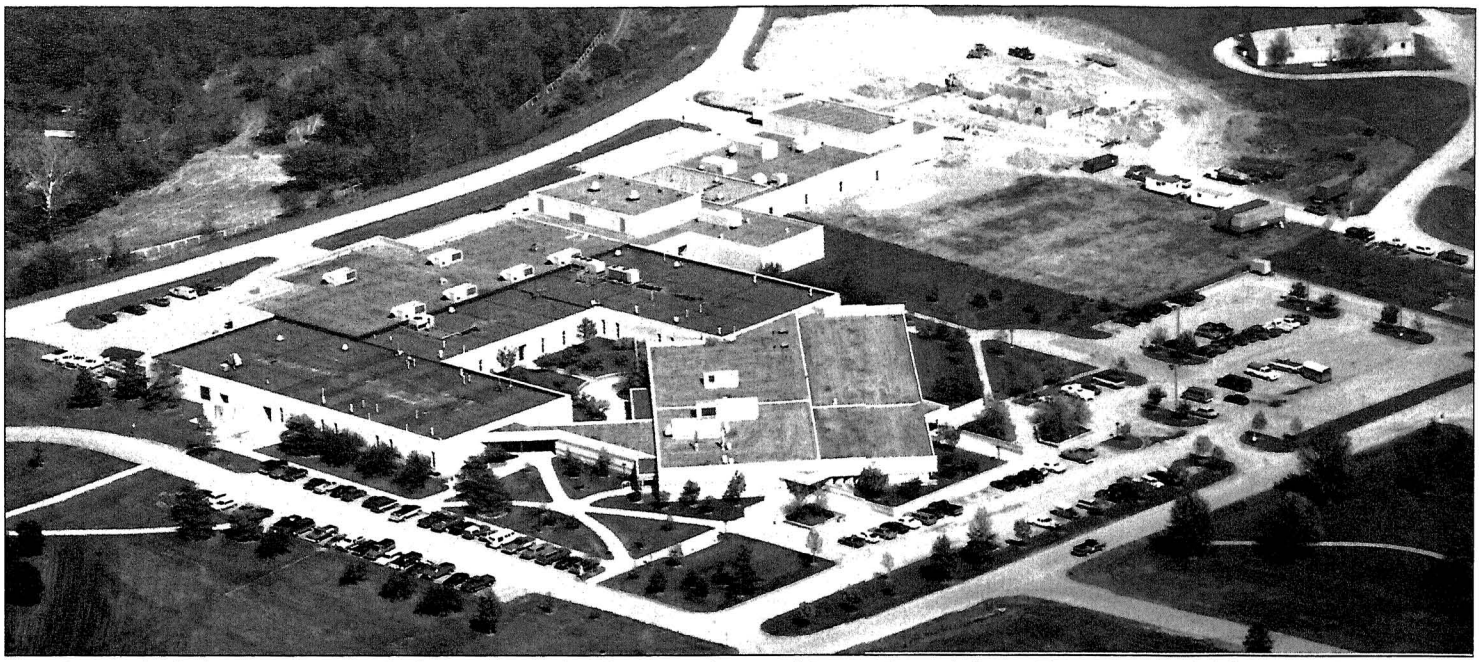
The Food for the 21st Century program was born out of a commitment by the University to plan to meet future needs in food and agriculture. The idea is to ensure an ample supply of quality food at reasonable prices; provide the nutritional know-how to help citizens live long, productive lives; stimulate the state of the economy; train scientists needed in Missouri's food and agriculture industry; and keep Missouri's agricultural researchers and scientists at the forefront of the development of cooperative programs and in collaboration with leading investigators around the world.

The program originated under the leadership of Dean Max Lennon. Because the subjects of food and agriculture cross over college and departmental lines, deans of the colleges of agriculture, home economics and veterinary medicine partnered to appoint a program planning group. This group included eight faculty members from these three colleges. They immediately began planning the objectives and scope for the program. Day of animal science was one of the eight members. Dean Roger Mitchell assumed leadership for the plan after Lennon left the University.

The F21C program was soon state-funded as a special new initiative within the University. Throughout the stages of the funding request, faculty members were asked to submit plans to achieve the goals of the program. The basis of their plans was to give the additional funding to recognized programs.

Meats faculty 1948-1995

D. E. Brady	professor, 1948-1958
Robert L. Henrickson	professor, 1951-1956
H.D. Naumann	professor, 1949-1986
Steve Zobrisky	professor, 1957-1967
H.B. Hedrick	professor, 1953-1993
G.G. Kelley	assistant professor, 1956-1957
M.E. Bailey	professor, 1958-1993
W.C. Stringer	professor, 1963-1995



An early event that had a major impact on the department was the relocation to the Animal Sciences Research Center. The center expanded the scope and opportunity for basic research in animal sciences.

Animal science's reproductive biology cluster was selected for additional funding. The first scientist to receive funds was professor R. Michael Roberts, who came from the University of Florida College of Medicine.

Roberts had long been collaborating with researchers in animal sciences in Florida. His work had led to the identification of a new group of interferons that are produced at the time of pregnancy recognition in ruminants.

Since joining the animal sciences division, Roberts has received numerous awards, including the Wolf Prize from Israel, and is one of two current University faculty members elected to the National Academy of Sciences.

Seven faculty members from animal sciences and veterinary medicine who focus on reproductive biology receive funding from the program. The reproductive biology cluster is now regarded nationally as one of the premier programs in this area. Since the research carried out in the cluster is aimed at basic physiological mechanisms underlying reproductive processes, it has relevance that extends beyond large-animal agriculture to human medicine.

Cluster faculty members have been successful at gaining external research support from the National Institutes of Health, industry and the USDA. Although research is the primary responsibility of the faculty members funded by the program, all cluster members assist with the teaching and service responsibilities of the Animal Sciences Division.

Research on fescue toxicosis

Over a period of 30 years that began in the mid1970s, research and extension programs addressed the issues of fescue toxicosis on animal performance, cow productivity and mare milk production.

Studies directed by professor George Garner showed that additives, byproducts and Ralgro implants dilute the adverse effects of the toxins that cause fescue toxicosis.

In cooperation with the Veterinary Diagnostic Lab, one of the toxins responsible for the effects of fescue toxicosis, ergovaline, was detected. Through surveys and research trials, the degree of impact of endophyte infection on cattle performance was shown.

Other research directed by professor John Paterson revealed the impact of environmental temperature and endophyte toxins on forage intake of cows. It was also shown in rats that antagonists could reduce the negative effects of these toxins on feed intake when the rats were exposed to heat stress.

Other studies directed by professor Wayne Loch revealed that endophyte-infected fescue reduced prolactin and progesterone levels in mares before foaling and that the dopamine-blocking drug perphenazine prevented these adverse effects.

More recently, professor Don Spiers' lab developed bovine and rodent models as biological markers of sensitivity. Studies at different levels have shown the impact of heat stress and fescue toxicosis on thermoregulatory ability, feed intake, digestion and antioxidant activity.

Dairy physiology and nutrition research

Spiers and associate professor Jim Spain have conducted research to evaluate the relationship between ambient conditions, animal thermal status and animal productivity. This research has examined the impact of bovine somatotropin and supplemental fat and vitamins in response to heat stress. These studies have also examined strategic cooling routines for high-producing dairy cows in order to evaluate their influence on digestive function. By understanding the cow's response to heat stress, the researchers hoped to

develop new approaches to reduce the impact of heat stress on milk production.

Spiers and associate professor Eric Antoniou will be conducting collaborative studies in functional genetics to determine the separate and combined effects of heat stress and fescue toxicosis. Using bovine and rodent species, they will use microarray technologies to provide a snapshot of the stress-induced shifts in regulation of 18,000 genes per animal. The ultimate goal is to generate superior lines of cattle in Missouri by identifying reliable markers of animal sensitivity to stress.

Ruminant nutrition research

In the area of ruminant nutrition, professors Monty Kerley, John Paterson, Malcolm Asplund and Jim Williams conducted research with beef cattle and sheep.

In the 1980s research emphasized forage use by cattle and sheep, supplementation, amino acid requirements of sheep and strategies to reduce the toxic effects of endophyte-infected tall fescue on animal productivity. Studies have demonstrated the advantage of giving byproducts, such as corn gluten feed and soy hulls, to forage-fed cattle. A series of grazing and feedlot studies revealed the previous impact of tall fescue consumption on performance and carcass characteristics of feedlot cattle. Another series of studies revealed that biosolids from dairy processing plants were free of environmental pollutants, high in protein and minerals and palatable to sheep, cattle and swine. Animal feeding studies revealed that feeding low levels of biosolids had no adverse effect on swine and ewes or their offspring.

In the 1990s advancements were made in understanding microbial protein dynamics in the rumen and amino acid requirements of the animal. Strategies were developed to enhance and manipulate postruminal flow of amino acids and other limiting nutrients to improve cattle performance on forage-based diets. Other studies showed that rumen-protected amino acids could successfully replace protein from traditional sources in the diets of dairy and beef cows. A series of studies revealed the beneficial effects of energy balance, vegetable fat and bypass protein on reproductive performance of heifers. These advancements in understanding led to increased growth and reproductive performance of cattle.

Research emphasis shifted from supplementing forage-fed ruminants to efficiently using both forage and concentrate diets. This redirection occurred to enhance production efficiency, meet the demand of increased back grounding and cattle-feeding interests in Missouri and address environmental pollution concerns. Studies have aimed to understand amino acid and energy nutrition so that feed conversion ratio can be improved. Another major thrust is nutritional evaluation of byproducts from ethanol production in cattle diets.

Swine nutrition

In the 1980s professor Trygve Veum directed the swine nutrition program. Research emphasized mineral and amino acid amounts in pigs between 15 and 60 days old. Studies revealed that adding lysine to extruded soybean meal improved nitrogen and energy utilization. The bioavailability of zinc in nonfat dry milk and soy flour was evaluated to determine tissue responsiveness to zinc deficiency. Bone was the major source of mobilized zinc in growing pigs and served as reliable index of long-term zinc status. Studies revealed that inclusion of fish oil in corn and soybean meal diets elevated amounts of omega-3 polyunsaturated fatty acids in sow milk and serum and baby pig serum.

In the 1990s the focus of research was to develop an economical feeding system for pigs weaned between 14 and 21 days that minimized nutritional stress. The feeding system was comprised of ingredients that enhanced feed intake and digestion and stimulated the development of gastrointestinal tract enzymes and beneficial micro flora. Studies have been conducted to determine the maximum dietary protein reduction that can be achieved without negatively affecting growth and carcass merit. Studies were also aimed at minimizing nitrogen excretion. Other efforts were to evaluate how phytic acid in grains and oilseed meals changes the requirements of mineral supplementation in swine diets. Efforts have evaluated the organic and inorganic sources of trace minerals for swine growth.

Poultry nutrition

During the last twenty years, professors Vandepopuliere, David Ledoux and Firman directed the poultry research program.

Vandepopuliere developed and evaluated processing and feeding methods for poultry byproducts. He also developed and patented an immersion heat treatment procedure for inactivating *Salmanella enteriditis* in intact eggs.

Ledoux has focused on improving phosphorus availability by developing in vitro procedures to predict phosphorus release from diets treated with phytase. Companies widely use this technology to screen phytase products and test quality. Research efforts have been underway to provide data on fumonisin toxicity in poultry that the Food and Drug Administration can use to prepare the advisory on fumonisin levels in feeds and feed ingredients. This program has developed models for in vitro and in vivo evaluation of mycotoxin absorbents.

Firman has focused on developing an ideal protein for turkeys. Recent results from this effort revealed that these diets could reduce feed costs and potentially save the turkey industry $1 billion over a ten-year period.

Physiology

Before the F21C program, professors Day and Michael Smith in animal science and Allen Garverick and Ted Mollett in dairy science used funding from the Weldon Springs Fund to form a seminar series for their newly formed animal reproduction group. The group decided to focus on reproductive

processes that regulate fertility in the female, especially ovarian function, early embryonic development and recognition of pregnancy.

Later, the F21C program strengthened the basic research effort and brought molecular approaches to the study of reproductive performance in domestic farm animals. The proposal in animal reproductive physiology was one of the first on campus to be selected for enhancement. Roberts was the first scientist hired into the F21C reproductive biology group. Professors Russell V. Anthony, who had research goals in the area of placental development, and Carl Pinkert, who had research goals in the areas of embryonic development and transgenesis, were also hired but later moved to positions elsewhere. Professors Randall Prather, whose research focus was in the areas of early embryonic development and cloning, and Matthew Lucy, whose research focus was in the area of ovarian function, were then recruited into those positions. Several recent additions have been made to the cluster.

One focus area in ovarian physiology is follicular development. Studies have been conducted to investigate mechanisms regulating follicular growth, and particular emphasis has been given to genetic control of follicular recruitment and selection in cattle. Differential gene expression for gonadotropin receptors and steroidogenic enzymes was determined for cattle by Garverick and Smith and for pigs by Lucy.

In addition, Smith and Lucy have related the association of follicular maturity by steroidogenic output and size to fertility and embryonic loss. Decreased conception rates and increased embryonic death were associated with smaller immature follicles. Infertility in cattle occurs when, forming an ovarian cyst, some follicles fail to ovulate and continue to grow and become dominant over other follicles. Garverick and Smith investigated and characterized follicular and cyst dynamics, abnormal endocrine secretion patterns and altered gene expression.

In addition, Lucy studied the role of growth and metabolic factors in regulating follicular development, and he identified a variant of the growth hormone receptor. Other studies in Lucy's program investigated the role of energy balance on follicular development and gene expression of steroidogenic and growth factors. Antoniou and Lucy currently use microarray technologies to identify numerous genes associated with follicular development, recruitment, selection and ovulation.

Professors David Patterson, Lucy, Smith, Garverick and Day study treatment regimens that could control both the follicular and luteal phases and serve as a basis for developing estrous synchronization and timed breeding procedures in cattle and swine. Other studies attempt to identify factors that regulate corpus luteum function.

A successful pregnancy is dependant upon the development and presence of a corpus luteum that secretes adequate amounts of progesterone. In postpartum beef cows, the luteal phase following first ovulation is of short duration, and regression occurs before recognition of pregnancy. Smith and Garverick determined that the shortened lifespan of the first postpartum corpus luteum was due to a premature release of prostaglandin $F_2\alpha$. Lucy characterized the growth hormone receptor in corpora lutea.

Neuroendocrine control of ovarian function has been a focus of Keisler's program. His early studies used feed restriction as a model for decreasing gonadotropin secretion and inhibiting follicular development and cyclic ovarian activity. From those studies, Keisler's research focus moved to appetite control with emphasis on the role of leptin and its secretion during different nutritional states.

Another area of emphasis has been fertilization and early embryonic development. Assistant Professor Peter Sutovsky's program focuses on spermatozoa development and maturation, fertilization and zygotic development. The ubiquitin system has been found to be a marker of infertility. Sutovsky has interest in further developing diagnostic tools that could identify infertility and assist reproduction. Day and Prather have developed in vitro culture conditions required for oocyte maturation, in vitro fertilization and early embryonic development. Their development of culture procedures allows study of factors regulating maturation, fertilization and early embryonic development on a large number of follicles.

In addition, studies of gene knockout and insertion are being conducted. One example from Prather's laboratory is the knockout of the alpha 1,3-galactosyltransferase gene, which may allow pigs to become human organ donors because the antigenic moiety of the cell membrane has been deleted. Studies from Prather's laboratory have also focused on nuclear reprogramming on embryos moving from a maternal organizational influence to fetal control. Professor Edmund Rucker has studied embryonic development and apoptotic mechanisms regulating embryonic cell death. Professor John Green's research program focuses on the role of pregnancy associate glycoproteins during fetal development, and he has developed a pregnancy test for ruminants that is based upon secretion of PAGs during pregnancy.

To gain a better understanding of reproductive processes, it is imperative to know which genes are transcribed and which are not transcribed. Since the reproductive system undergoes dramatic changes in function during the normal reproductive cycle and pregnancy, it was thought that there would also be dramatic changes in the transcriptome. Two large genomics projects led by Prather and Green and involving a number of additional faculty members have helped to unify the direction of the reproductive biology faculty. These projects, of which one is being conducted in pigs and one is being conducted in cattle, were driven by the need to have a characterization of the transcription of reproductive

tissues and resulted in the identification of a large number of previously uncharacterized mRNAs that are produced during the reproductive cycle or pregnancy. Such information has permitted the development of microarray tools that allow investigators to evaluate large numbers of genes in a single experiment; over 15,000 gene products have been evaluated at a single time in the pig. Thus, global changes in gene expression can be determined in both pigs and cattle.

Swine genetics

Efforts in swine genetics research in the 1990s resulted in contributions to a multi-state collaborative effort to determine the effects of physiological components on swine litter size. A model was developed for components of litter size that included ovulation rate, fertilization rate, early embryonic survival, uterine capacity, fetal demand and placental efficiency. Selection on placental efficiency showed that it is heritable, but when incorporated into a selection program it resulted in smaller litter size. Professor Bill Lamberson and Safranski have made strides in identifying genetic factors that impact litter size in sows.

Meats

In 1998 Berg joined the animal science faculty. His appointment renewed the discipline of meat science in the classroom and in the research arena. His area of expertise was in the use of non-traditional feedstuffs as a means to improve health, performance, growth and quality of meat-producing animals.He has established a strong network of collaborators from the animal science department, allied industry, the college of veterinary medicine, the medical school, the department of food science, fisheries and wildlife and biomedical science. Berg has developed collaborative research relationships with Hormel and Tyson foods. Future plans for his program include physiological response to production stress, nutritional intervention and preslaughter stress and the resulting influence on muscle-food quality.

The future of the livestock industry

The research emphasis of the animal sciences department has changed considerably between its creation and the 21st century. In the early years, the main focus was to develop feeding programs for livestock and evaluate livestock. Former animal husbandry faculty members made outstanding contributions to our knowledge of nutrition, physiology and genetics that have enhanced animal production. During the past 20 years, there has been a shift toward basic research that can address the key issues such as production efficiency and reproductive performance of livestock and human health and reproductive challenges.

A few of these programs illustrate the complexity of the current technology and demonstrate the uniqueness of the faculty member's contributions to a knowledge base for future generations of livestock production.

Sutovsky is studying how to use ubiquitin as a marker to assess fertility of male livestock and infertility of human males.

Taylor's research program is directed at genes, mutations of genes and DNA sequences that control the expression of genes that affect economically important livestock traits. The impact of this research will be in the understanding of genes controlling growth, feed efficiency and carcass quality in beef cattle and milk production and fertility in dairy cattle.

Prather has turned his attention to genetic mechanisms responsible for 30 percent loss of conceptus during early gestation and how the reproductive process can be manipulated with this knowledge. His goal with this project is to enhance production agriculture for future generations. Prather's research has also created a tool to monitor 14,000 pig genes in a single experiment and create animals that could be used to donate organs to human patients.

In the nutrition area, Allee has gained a national and international reputation in modification of swine diets for commercial operations. One of his significant contributions was revealing that a 3 percent reduction of protein in swine diets would reduce nitrogen excretion without impacting growth performance and carcass characteristics. His work has also shown that genetically modified corn or soybean meal in swine diets or the use of a phytase enzyme will reduce phosphorous excretion by 30 percent.

Kerley has embarked on a research program to study how diet formulation and cellular energetics influence feed efficiency in cattle. His research has shown that formulating diets based upon amino acid requirement of the animal can improve efficiency of growth relative to current standards. Other research demonstrating that mitochondrial respiration influences feed efficiency will likely alter the current approach to animal selection and make possible a substantial improvement in the efficiency of beef cattle growth and reduction in the maintenance requirements of the cow herd. The combination of diet formulation and selection of beef cattle based on mitochondrial respiration could greatly increase feed efficiency of beef cattle.

Discovering how certain dietary fats change the function of the immune system is the focus of professor Kevin Fritsche's research program. His program has shown that fat sources, such as menhaden fish oil, change the immune system of chickens, pigs and laboratory rats. He is now exploring how these changes in immunity and infectious disease resistance may be used to benefit animal production.

Staff

The department has been blessed with outstanding support staff truly dedicated to serving the faculty of the animal science department. The secretaries, farm managers, research associates and animal technicians are

extremely talented and a true asset to the department. It is impossible to recognize all of the staff that contributed over the course of 100 years to the success of this great department. Like those who served in the past, the current staff have made a significant contribution to educating students and training graduate students and post doctoral fellows who have carried out important agricultural research for the state, nation and world.

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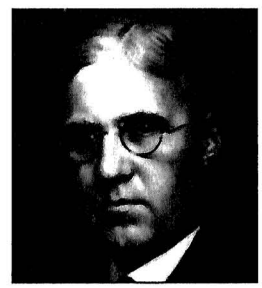
Eckles Hall was the home of the Dairy Husbandry Department from 1901 until 1984 when the department moved into the Animal Sciences Research Center.

The Department of Dairy Husbandry



Clarence H. Eckles was selected as the first head of the dairy husbandry department in June 1901. Eckles is credited with "putting dairy husbandry at the University of Missouri foremost on the map of the world." He played a key role in the development of the department.

Dairying was gaining headway in Missouri, and the college was gaining favorable recognition. The 41st General Assembly of the Missouri Legislature approved a law on April 17, 1901, that established a department of dairy husbandry in the college. The legislature also provided the first major building for instruction and research in dairying. An appropriation of $40,000 for the construction of "laboratories for livestock judging, dairy instruction and veterinary science" was made. The dairy building proper cost about $30,000 and was the first wing of Eckles Hall.

As with many worthwhile endeavors, the University of Missouri Department of Dairy Husbandry came from a grass roots effort.[1]

Early settlers coming to Missouri brought dairy cows with them. Interest in dairying grew throughout the state following the Civil War. By 1890 the Missouri census reported about 710,000 milk cows. For the most part, these were cattle of rather nondescript breeding kept for both meat and milk. Shorthorns, Devons and Durhams were fairly prominent. The sale of milk and cream added to the income of most farms. Herds were small with an average of eight milk cows. Small creameries that made cheese and butter were established throughout the state.

The first dairy organization, the Missouri State Dairy and Creamerymen's Association, was organized Sept. 24, 1890, in Kansas City. Levi Chubbuck, secretary of the State Board of Agriculture, arranged the meeting (Herman and Ricketts, 1988). At this meeting, members planned an educational program involving the board, the college and the association. The organization grew in numbers and strength and was a vital force in securing legislative support and recognition for the growing dairy industry in Missouri.

The first bulletin about dairying, Missouri Agricultural Experiment Station Bulletin 26, was published in 1894. The bulletin explained how to care for milk and make butter.

Beginning in the winter of 1895, the University offered a course in dairying, and one of the texts was the 1894 bulletin. A special instructor was hired, and arrangements were made for the proper teaching of butter and cheese making and testing milk for butterfat. The Babcock Test, which had come into use in 1890, was used to test for butterfat.

Some minor feeding experiments were conducted by department members, and a study of milk creaming and churning was made. Tests of some of the new dairy equipment coming on the market and studies on the milk-producing abilities of milk cows were also conducted.

In 1887 professor J.W. Sanborn, who was the second dean of agriculture from 1882 to 1889, purchased four Jersey cows and a bull. He initiated the practice of keeping complete milk records on each cow and established a herd record system. Complete breed, calf, health, milk and butterfat records on each cow in the experiment station herd have been kept since 1901. In addition, data on growth, body weight and other information have been recorded and serve as the basis for research that has yielded valuable information.

In 1890 Dean Edward D. Porter renovated a small frame building on the east side of the University Campus Farm with a cream separator, churn, butter worker, hot and cold water and other necessities. This became the first dairy building (Herman and Rickets, 1988). This building was later used by animal husbandry as a slaughter house.

When the the dairy husbandry department was established, the duties of the professor of dairy husbandry were set forth, and $5,000 was appropriated for maintenance. Clarence Henry Eckles, a graduate of Iowa State College with a master's degree in bacteriology, was selected in June 1901 to head the new department.

Eckles was a wise choice. He not only conducted innovative research on feeding and managing dairy cattle, he was a great teacher and worked well with farmers. He was credited with "having his feet on the ground." He traveled throughout the state and talked to farmers and dairy producers, analyzed their problems and planned research and instruction to meet their needs (Herman and Ricketts, 1988).

The department has a long, strong heritage in research, teaching and extension. Early faculty had programs in all three facets.

Facilities

Campus Dairy Barn

In 1912, a dairy barn measuring 160 feet by 80 feet was constructed on what would now be the southeast side of campus. The barn was considered a model dairy barn showplace and was used for many statewide dairy judging contests. The dairy farm area also was the site of a calf and bull barn built in the same year. Fire destroyed a major part of the barn in 1958. Temporary milking facilities were set up in the part of the barn that was not destroyed, and some cows were moved to the University's Foremost Dairy Center west of Columbia. A new barn was quickly built near the dairy center on Highway 40 west of Columbia. The The new barn first housed the Holstein and Jersey cows in 1959.

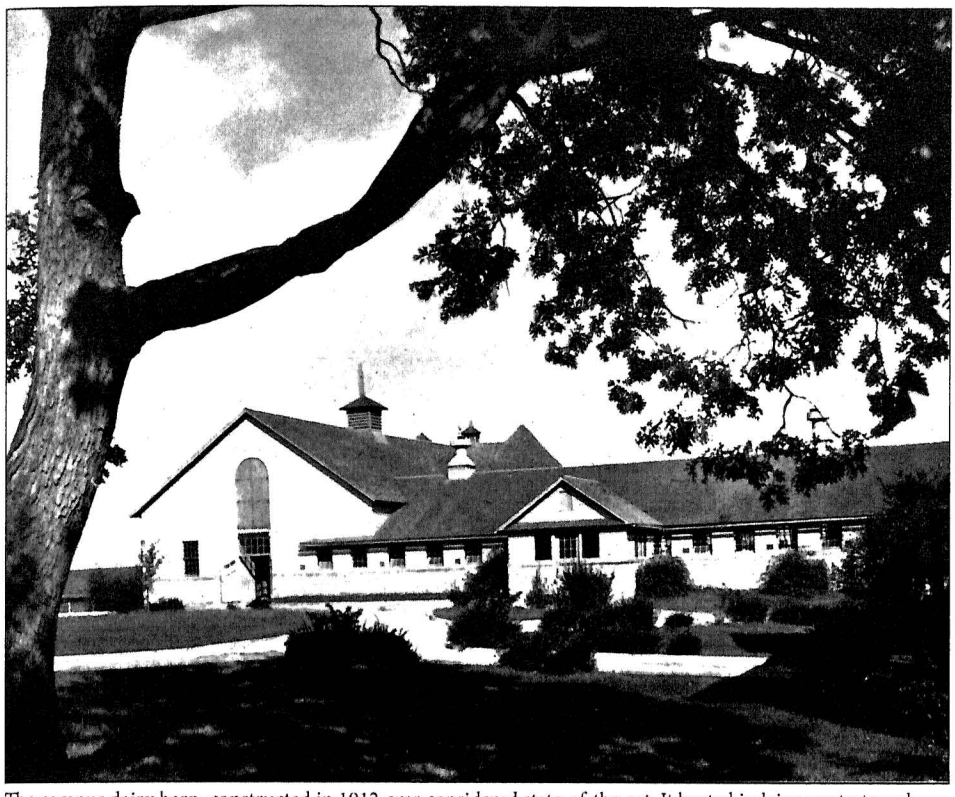
The Climate Laboratory

The Climate Laboratory was a unique facility at the time it was built. In 1945 professor Samuel Brody initiated a cooperative project among dairy husbandry, agricultural engineering and the United States Department of Agriculture Bureau of Plant Industry, Soils and Agricultural Engineering to establish the laboratory.

Brody listed four major reasons to begin the environmental physiology and shelter engineering project: to understand how the breeds of livestock react to climate, to understand what type of shelter is necessary for livestock, to relate global climate conditions to livestock and human productivity and to study climatology, physioclimatology, bioclimatology and environmental physiology.

Initial funding was given in 1948 to establish a large animal chamber that could support cows over a long enough period of time to allow assessment of the effects of climatic factors on

[1]Additional information and memorabilia are located at the Missouri Dairy Hall of Honors. The hall of honors can be found in room S116 of the Animal Sciences Research Center, which is located at East Campus Drive in the MU campus. Special Report 382 written by Herman and Ricketts in 1988 contains a complete list of department chairmen, faculty and staff.



The campus dairy barn, constructed in 1912, was considered state-of-the-art. It hosted judging contests and visitors from around the state. The barn made headlines in 1959 when one of its wings was damaged by fire. That fire was the reason the Holstein herd was moved to a new site west of Columbia.

productivity and related physiological functions.

Agricultural engineers constructed the climate laboratory. It had two large chambers with temperature, humidity, light and air flow controls. Cows were milked in the chambers, and their milk was processed in a small room at the back of the facility. The materials to create the facility came from government surplus material. The facility required a support team of faculty and technical staff. Sam Barret was an engineering technician who contributed to the laboratory's innovations and operated the facility for many years. Many classical publications told of studies conducted in this facility. In 1985 a new Climatology Laboratory was incorporated in the Animal Sciences Research Center, and the laboratory activities were moved from the original building.

Dairy Farms

The Foremost Dairy Center was established in 1952 as part of a gift from J.C. Penney. Penney donated his world-famous Foremost Guernsey herd, a farm at Hopewell Junction, N.Y., and other assets such as all equipment and a foundation fund of about $250,000 to aid in perpetuation of the herd. The value of the gift totaled about $750,000. The terms of the gift made it possible for MU to purchase about 600 acres west of Columbia, erect the necessary buildings and move the herd from New York by train to Columbia.

The Foremost Dairy Center was operated as a separate unit until 1979 when economic constraints and a need for efficiency caused the University to transfer its Holstein herd from an adjoining farm to the dairy center. The Holstein farm was converted into a dry cow and heifer facility.

The University dairy farms now comprise some 1,065 acres. Six hundred of these acres are used as cropland. The dairy center and the Holstein farm served the department well. Throughout the years, many students in the college assisted with the dairy herd and farm operations such as milking, feeding, crop production and research projects. These students not only gained valuable experience, but also earned part of their college expenses.

The Southwest Center

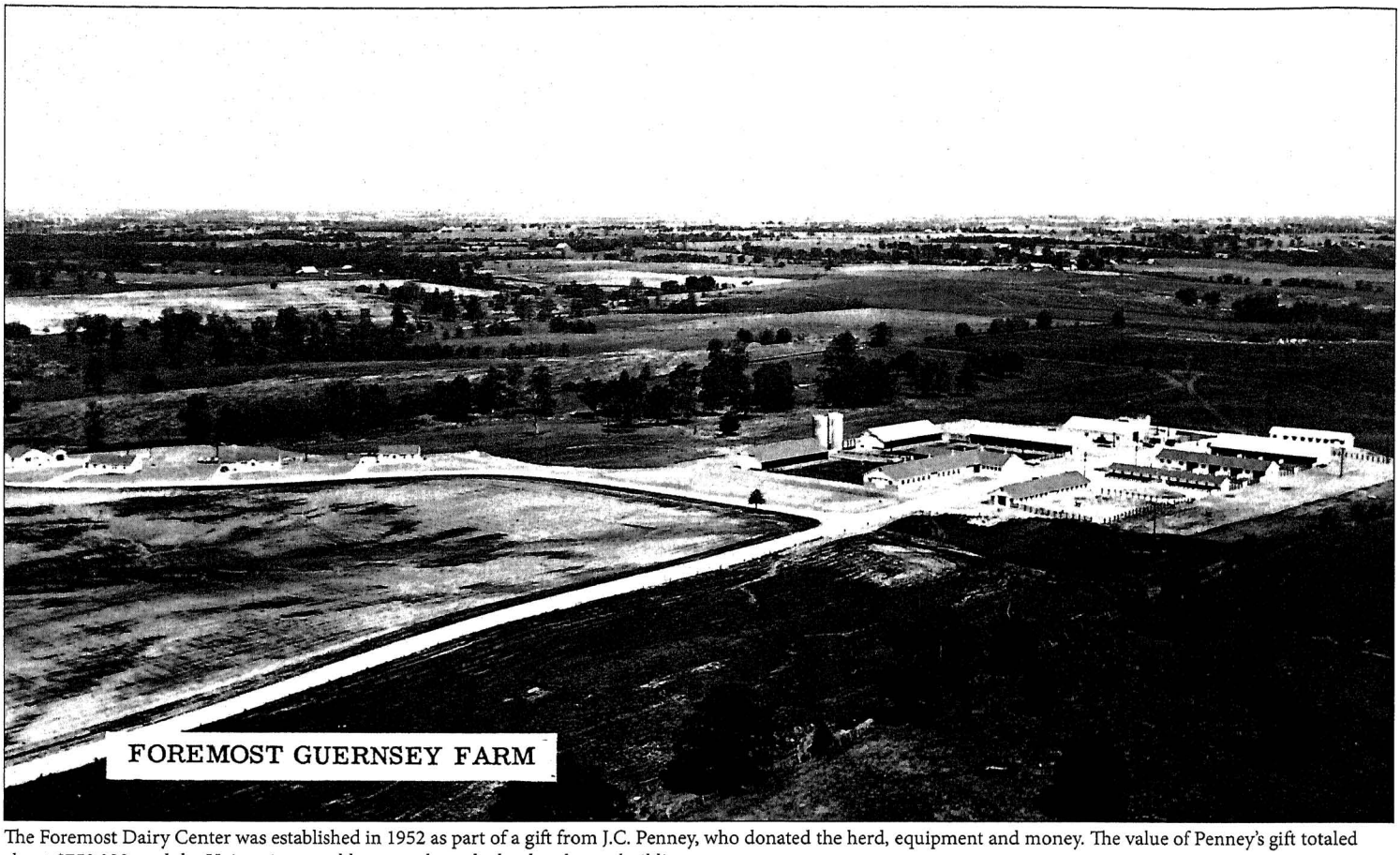
As early as the 1970s the plan for the Southwest Center, established in 1959, called for a milking herd to be located at the center. In the mid-1990s several people in southwestern Missouri expressed interest in a pasture-based dairy at the center. The desire was that this dairy research farm would not duplicate the dairy farm located near the MU campus. Two local people active in dairying, Leonard Goodman and Marilyn Calvin, who was a MidAmerica Dairy board member, were persistent promoters of the dairy. Rich Crawford, superintendent of the center, and local extension specialists Stacy Hamilton, Tony Rickard and Ron Young conceived the original plan for the dairy.

In 1998 Roger Mitchell, dean and director of the experiment station, gave his approval with the stipulation that the dairy had to be financially sustainable, and the facility became functional in 1999. MidAmerica Dairy, Kraft Inc., the Missouri Dairy Association and the experiment station all provided funds to construct the facility. The initial herd had about 40 heifers that were donated by about 20 local producers. The dairy used management-intensive grazing techniques developed at the University.

Initially, many people expressed concern that a pasture-based dairy would be unsuccessful. Contrary to those predictions, the dairy has always been financially sustainable. Field days draw from 250 to 300 visitors, and faculty and staff conduct applied research at the facility. The benefits of the facility have inspired the establishment of numerous pasture-based dairies in the area.

Metabolism Building

The metabolism building was constructed in 1980 adjacent to the Whole Animal Low-Level Radiation Counter facility located on Campus Drive. The building was 40 feet by

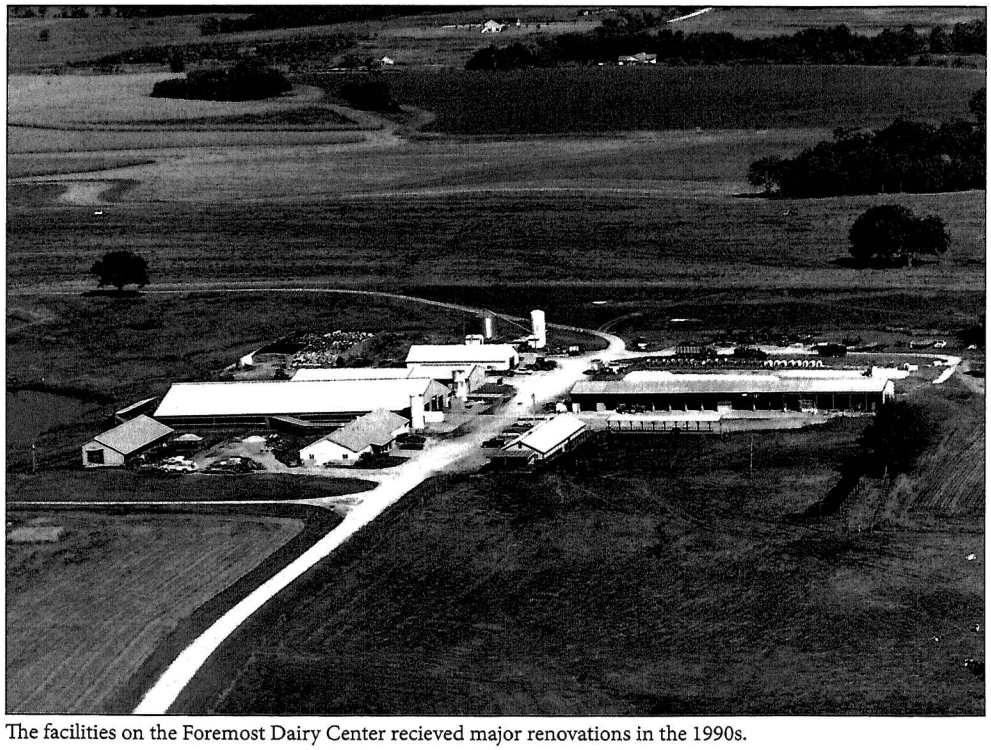


The Foremost Dairy Center was established in 1952 as part of a gift from J.C. Penney, who donated the herd, equipment and money. The value of Penney's gift totaled about $750,000, and the University was able to purchase the land and erect buildings.

120 feet and was specifically designed to support metabolism studies that used radioactive tracers. Cattle were the main animals of interest, and the facility had space for 12 lactating cows, 24 1000-pound growing animals and 24 500-pound growing animals. This facility was used for a number of metabolic trials between 1980 and 1992. It was torn down in 1992 to make room for the veterinary science building, Clydesdale Hall. Unit F of the Animal Sciences Research Center replaced the metabolism building.

The Hatch Dairy Experiment Station

The Hatch Dairy Experiment Station, located just south of Hannibal, Mo, on U.S. Highway 61, was started in 1930 and operated until 1968. The 116-acre farm was formerly known as Strawberry Hill and was the home of William Henry Hatch, who was a Missouri Congressman from 1878 to 1894. At Strawberry Hill Farm, Hatch maintained a registered Jersey herd,



The facilities on the Foremost Dairy Center recieved major renovations in the 1990s.

Kentucky trotting horses and Southdown hogs. Hatch's daughter, Sarah Rhodes Hatch, bequeathed the farm to the state of Missouri upon her death in 1923.

Congressman Hatch sponsored more than 50 bills relevant to agriculture. He and his legislative partner, Sen. Coleman, were responsible for the Federal Hatch Act that established and continually supported agricultural experi-

ment stations connected to each state's college of agriculture. He was chiefly responsible for establishing the position of Secretary of Agriculture in the president's Cabinet, the USDA Bureau of Animal Industry, the first federal law to prevent the spread of infectious diseases among domestic animals, the first oleomargarine law and the agricultural census. After losing a race for Congress in 1894, he became president of the National Dairy Union and continued to advocate for pure dairy products. He died at Strawberry Hill in 1896.

The development of Hatch station began in 1930 after the state assigned it to the college for a dairy experiment station. The 55th General Assembly of the Missouri Legislature and the U. S. Congress appropriated funding to establish and operate the station. The Department of Dairy Husbandry, the University and the Dairy Division of the USDA Bureau of Animal Industry jointly administered the station.

The research program at the Hatch Station involved:

- establishing a strain of Jersey cattle solely for high production
- collecting complete records on production, type, reproduction, health, genetics and other information as a basis for further studies
- investigating different crops and systems of grazing and weed control on pasture.

In 1963 Dean Elmer Kiehl organized a series of activities to commemorate the 75th anniversary of the Hatch Act. Participants gathered on the lawn of Hatch Experiment Station on April 9, 1963, to eat ice cream and listen to a presentation by Oliver Howard. Kiehl had commissioned Howard, historian of Ralls County, to prepare a detailed biography of Hatch. The full text of her biography, titled "William Henry Hatch, Hannibal," is published in University of Missouri Agricultural Experiment Station Bulletin B810, '63/3.5m.

When the station shut down, the Jersey herd was moved to Columbia. The station's research projects were redirected and moved to the Southwest Center. One such project used heifers from the University Holstein herd as tester animals in forage research until the late 1980s. About two months before calving, the heifers were returned to the main Columbia herd.

Teaching

The first course in dairy husbandry was taught four years before the department was established.

In 1911 Eckles published the first edition of his textbook, "Dairy Cattle and Milk Production." Several later editions were published, and a current revision of this book was used at Purdue University in an introductory dairy science course as late as 1956 (Martz).

Ragsdale describes the department's progress in those early years as follows: "A special course in dairying was offered in the winter of 1901-1902 and five short courses. Students enrolled in courses in farm dairying, farm sanitation, judging and testing dairy products and creamery butter making. A course in dairying was required of all students completing the collegiate course in agriculture. The following year 16 students enrolled in a course in elements of dairying and three in a course in milk production. Five years after the department was established, the collegiate enrollment in dairy husbandry courses totaled 59. After 10 years (in 1911-1912), the enrollment in dairy husbandry courses numbered 253. After reaching a maximum of 320 students in 1913-1914, the number had dropped due to war conditions to 96 in 1918-1919, the year Prof. Eckles left Missouri. Student numbers then reached 211 ten years later (1928-1929), 537 in 1938-1939, and gained steadily in the years to follow."

An examination of copies of the MU Milkman indicated that the students in dairy husbandry declined during the World War II years, and by 1955 there were about 60 students. Further decline was recorded for the late 1970s with about 30 to 50 students enrolled.

By 1939 a full array of courses in dairy husbandry had been developed. Undergraduate courses offered by the department included elementary work in animal science and dairy husbandry, dairy cattle judging, dairy production, dairy cattle breeding and field training in dairy husbandry. Graduate courses included dairy chemistry, rumen physiology, endocrinology, physiology of milk secretion, environmental physiology, bioenergetics and advanced dairy production.

Courses in manufacturing included market milk, bacteriology and standard methods for dairy products, ice cream, butter and cheese. Over the years the major teaching topics have stabilized, but course content and technology has changed.

Courses listed for 1970 were:

- Dairy Husbandry
- Animal Science
- Dairy Cattle Judging
- Advanced Dairy Cattle Judging
- Dairy Cattle Breeding
- Artificial Breeding
- Physiology of Cell Preservation
- Endocrinology
- Anatomy of the Mammary Gland
- Physiology of Milk Secretion
- Bioenergetics
- Dairy Production
- Advanced Dairy Production
- Environmental Physiology

Students in dairy husbandry gained extra experience through extracurricular activities. The student Dairy Club began in 1906. Eckles was responsible for initiating the first meeting. Its purpose was to acquaint students with the broad educational program provided by the University, enable students to gain contacts with dairy industry leaders and opportunities for jobs in the field, sponsor and encourage student projects associated with dairying and provide an atmosphere for developing leadership and social contacts.

The club invited an industry speaker at least once per month. Members of the club assisted with meetings,

shows, sales and other events of the department. From 1955 until 1974, the club published an annual report, The MU Milkman, that contained information on departmental projects and programs, staff members, student members and graduate students. The report helped students, staff and dairy industry members to become acquainted. Professor John Campbell, who served as dairy club advisor during those years, was a driving force behind the publication. From 1938 until the 1970s, the club sponsored an annual collegiate dairy cattle judging contest. The club held an annual picnic for students and faculty, at which new officers were elected, and for a number of years the students challenged the faculty to a game of softball.

The Dairy Club was combined with another MU club, the Block and Bridle Club, in the 1990s.

Judging teams

Youth, collegiate and intercollegiate teams have been a part of the department nearly since its beginning. Various historical writings refer to state youth cattle judging contests that were held in connection with the department.

The college has the distinction of being the first to send an intercollegiate dairy cattle judging team to a national contest. The first such contest was held in 1907 at the National Dairy Show in Chicago. A team, consisting of five dairy students coached by Eckles, was entered into the contest. No other teams appeared, so the MU team members staged a contest among themselves — and were declared the winners. It was the only team Eckles coached at the University. Members of the 1907 team were O.E. Reed, who became the first chief of the USDA Bureau of Animal Industry; R. H. Mason; C. E. Snellings; Norton Shepherd; and H. E. McNatt, who became a staff member and coached the 1909 and 1910 teams.

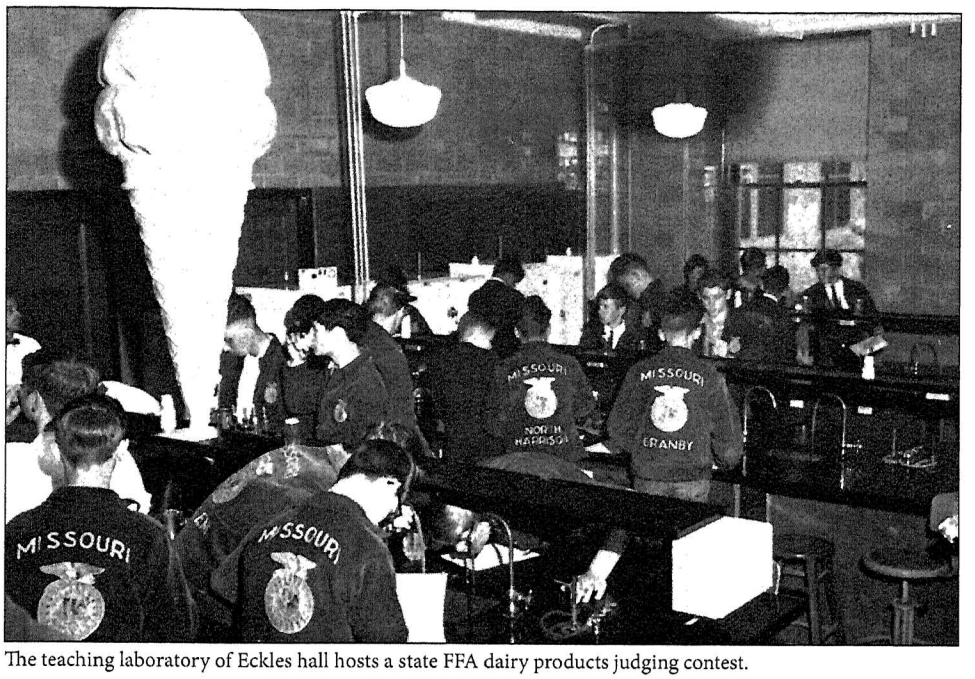
Reed coached the 1908 team. This team consisted of P. M. Brandt, who later served as head of the dairy department at Oregon State University; H. A. Henley, who later became a staff member of the MU department of soils; E. V. Ellington, who later became head of the dairy department at Washington State University; and J. B. Gordon, who later became manager of the Bureau of Raw Materials, American Vegetable Oil and Fats Industries.

Students who were fortunate enough to be selected for the intercollegiate dairy cattle judging teams gained valuable experience and new perspectives of the dairy cattle industry through traveling, meeting prominent cattle breeders, viewing herds and becoming acquainted with industry leaders. Contact with members and coaches of competing teams also brought lasting experiences.

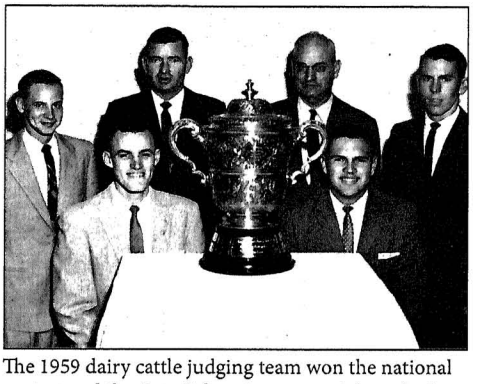
The challenge to win at the contests was very high. The MU dairy cattle judging teams have been the success-

Dairy husbandry faculty 1901-1979

Clarence H. Eckles	1901-1919, Professor and Chair
LeRoy S. Palmer	1913-1920, Assistant Professor
Arthur C. Ragsdale	1915-1961, Professor Emeritus and Chair
Willis B. Combs	1915-1920, Assistant Professor
Walter W. Swett	1916-1922, Associate Professor
Erskine M. Harmon	1918-1926, Professor
Arthur C. Dahlberg	1919-1920, Assistant Professor
Samuel Brody	1920-1956, Professor
Charles W. Turner	1927-1976, Professor
Warren Gifford	1925-1939, Extension Assistant Professor
Earl R. Garrison	1926-1945, Assistant Professor
Harry A. Herman	1929-1953, Professor
Charles W. McIntyre	1931-1945, Assistant Professor
Wendell Arbuckle	1936-1941, Instructor
W.R. Graham	1936-1938, Assistant Professor
Hudson H. Kibler	1940-1969 Research Associate
Paul R. Cornelison	1941-1957, Associate Professor
Joseph E. Edmondson	1941-1967, Professor
E. T. Itschuer	1942-1963, Professor
James K. Gholson	1946-1955, Assistant Professor
William H. Cloninger	1947-1953, Extension
James W. Cobble	1947-1951, Instructor
Clifton Blincoe	1948-1956, Assistant Professor
Robert G. Jensen	1950-1956, Assistant Professor
Charles F. Foreman	1951-1953, Assistant Professor
Kenneth Bower	1952-1969, Research Associate
W. R. Kirkam	1953-1954, Research Associate
Fred H. Meinershagen	1953-1961, Extension Professor
John Campbell	1958-1978, Professor
Raymond G. Hinders	1963-1965, Assistant Professor
A. G. Lane	1964-1970, Assistant Professor
Stanley E. Curtis	1968-1970, Assistant Professor
Theodore A. Mollett	1979-1985, Assistant Professor



The teaching laboratory of Eckles hall hosts a state FFA dairy products judging contest.


The 1959 dairy cattle judging team won the national contest and the Otto Schnering memorial trophy.Bottom row (left to right): Aubrey H. Letsinger and Joe Whetstine. Top row (left to right): Marvin Oetting, John Sikes (coach), Professor A.C. Ragsdale (department chairman) and Duane Scott.

ful at the national collegiate contest on several occasions.

In 1954 the University began sending an intercollegiate dairy products judging team to national and international contests. The first contest was in Chicago in connection with the international dairy show. The Missouri team was coached by J. H. Gholson and consisted of Duane Leiter, John Campbell, Glen Huskey and Phillip Warren. Eight teams entered, and Missouri placed fourth in the contest for all products, second in cheese and ice cream, seventh in milk and eighth in butter.

A team has been entered in national and international intercollegiate contests almost every year since. The University team has won the international contest three times and has often been successful in individual products. Many team members have also placed first in the various products division. J. E. Edmondson coached the team from 1955 to 1958. Kenneth L. Smith coached the 1959 and 1960 teams. Robert T. Marshall became coach in 1961, and continued, with the assistance of professor Dean Shelley, until 1999. Richard Linhardt has coached teams since 2000.

In 1953, the Dairy Club began sponsoring a collegiate dairy products judging contest. The contest rates milk, butter, cheese and ice cream. The winning individual for each product is awarded an engraved plaque and a trophy. This event has become popular among students. The staff of the Department of Food Science and Nutrition managed the contest for a few years beginning in 1968 with assistance from members of the intercollegiate dairy products judging teams.

Extension

As early as 1890, the Dairy and Creamerymen's Association and the Missouri Department of Agriculture carried out some programs to improve and promote dairying in the state. In 1901 Eckles toured the state to visit dairy farmers and dairy plant operators. Meetings were held and lectures presented on phases of herd management and manufacture of quality dairy products. In 1914 Congress established the extension service.

Eckles worked closely with the Missouri Department of Agriculture on programs dealing with producing quality milk, selling dairy products, operating creameries, controlling tuberculosis in cattle and practicing fair trade.

Eckles was also involved in other legislative matters such as the establishment of the state dairy commission. R. M Washburn became the first state dairy commissioner in 1905, but in some years it was difficult to get the Legislature to fund the office.

In 1916 the board of curators authorized the appointment of a traveling dairy instructor with the stipulation that he or she devote full time to organizing and instructing dairy associations and dairy farmers in Missouri. Available records do not make it clear whether this traveling instructor was ever appointed, but in January 1914 J. Watson was appointed dairy specialist. He served for only four months. In July 1915 A. C. Ragsdale joined the department as the extension dairy specialist.

Despite ever-changing technology, communications and economic conditions, dairy extension workers were able to impart practical information and assist in programs that benefited dairy farmers and their families. An early example of community involvement is from around 1920 when the department organized local companies of businessmen and bankers to establish purebred dairy cattle centers. Each company backed a farmer in the purchase of one to five purebred cows at a common purchase rate that was equal to the going price of a local "scrub" cow. The company paid the excess cost of the purebred cow. All the production and half the calves went to the farmer, which increased his or her profit. The company owned the cows and the other half of the calves, which made a good return on the investment.

From 1914 to 1969, state extension dairy specialists worked with local county agents. In 1970 extension began operating by the regional concept. Regional dairy specialists were installed in the nine principal dairy areas of the state. This move created close working relationships among dairy producers, milk plant operators and the extension program. Because of reorganization and a lack of funding, there are currently only four regional dairy specialists. Among the state dairy extension specialists between 1970 and 2000 were Barry Steevens, who had the longest tenure, Jennifer Garrett, Mike Brouk and James Coomer.

An extension document in 1959 described four keys to greater profit for dairy producers: volume production, quality forage, record keeping and efficient marketing.

Dairy extension has been instrumental in helping producers plan and build new dairy facilities and expand their business. One of the regional specialists developed necessary skills to help dairy producers construct new milking parlors and free stall barns for herds with 30 to 100 cows.

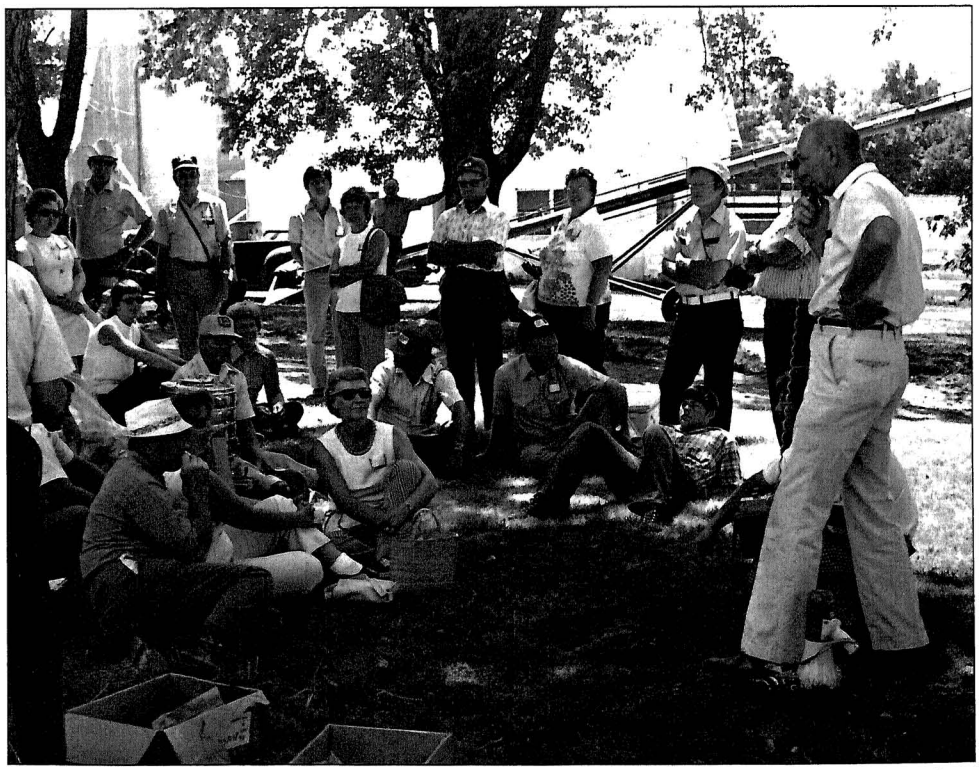
Dairy facilities constructed at the Foremost Dairy Center in 1952 demonstrated current technology to dairy producers. These facilities were updated in 1991 and 1992. The updated facilities included a new, free-stall barn with a flush cleaning and solids separation system that was funded by a gift from Raymond D. Pennewell, a Guernsey breeder from Palmyra, Missouri. Other features were a fully automated milking center with cow identification and computer management; a hay storage barn; a palpation and exercise barn; a dry-cow, free-stall barn; and a feed byproducts storage and handling facility. During this period dairy extension personnel helped the Dairy Herd Improvement Federation evolve to a stand-alone organization that could meet the needs of dairy farmers. The federation offers a milk testing laboratory and a forage testing service to provide essential milk and forage information.

In the early 1990s an interdisciplinary group developed an extensive manual about the economics of using Total Mixed Rations on Missouri dairy farms. This manual was in response to survey data that found Missouri dairy farms to be behind the rest of the U.S. dairy industry in the use of this feeding technology. The manual discussed the nutrition, engineering and economic aspects of adopting TMR. Professors Jim Spain and Jennifer Garrett presented the concepts in the manual at short courses around the state. These short courses introduced a computerized ration balancing program that could be used by regional dairy specialists on a desktop computer.

The University also introduced Cow Colleges in the 1990s. These educational programs were offered in four regions of the state in partnership with the regional dairy extension specialists. The Cow Colleges were later cosponsored by the Missouri Dairy Association and have currently evolved into the Dairy Profit Seminars.

In 1992 the byproduct feed price listing was established. This project started as a cooperative effort partially supported by the Missouri Dairy Association. The list resides on the agricultural electronic bulletin board supported by University extension's commercial agriculture program. The byproduct bulletin board has been adopted by a number of other states. Data Transmission Network picks up the bulletin board and distributes it nationally and internationally to over 15,000 members weekly. The uniqueness of the bulletin board is that it provides timely feed price information online. In 2005, 45 different companies were listed as supplying byproduct feeds. Companies listed on the bulletin board list their feed commodities, weekly prices, availability and a point of contact.

Milking management and mastitis control is an important part of dairy herd health. The dairy extension program has had a major focus in the education of dairy producers on the value of teat dipping and dry cow treatment, which are two practices endorsed by the National Mastitis Council. The



Three busloads of Missouri dairy farmers, agribusiness representatives and others interested in dairying gather on Leonard Goodman's farm in July 1974 as part of a two-day tour to southwest Missouri to view emerging dairy farm practices.

extension program formed a Missouri Mastitis Council, training schools and educational programs about udder health. Cooperative extension programs with veterinarians, milking equipment dealers and milk-plant field representatives spread information statewide.

Extension's Missouri Commercial Agriculture Program established a dairy focus team in 1992 that has been a unique strength to the dairy extension program. The dairy focus team includes the traditional dairy extension faculty members as well as additional faculty members with expertise in farm management, agricultural engineering, veterinary medicine and waste management. The dairy focus team has been able to address broad-based problems that influence profitability and sustainability. Its projects include 500-Cow Dairy Plan, the Dairy Heifer Plan, a Web site, Missouri Dairyman's Resource Guide and high-level seminars designed to enable existing and new dairy producers to plan a successful career in the dairy business. Collaborative efforts with veterinary medicine have resulted in an integrated approach to on-farm problem solving and an improved service to dairy producers.

Research

The success of research, teaching and extension is dependent on people and their projects. The dairy husbandry department had good staff members and projects over the years. Staff members worked long, hard hours because they loved what they did and held strong convictions about its value.

The first publication by Eckles was Missouri Agricultural Experiment Station Bulletin 483, published in 1902 (Herman and Ricketts, 1988).

The excellence of the research work in dairy husbandry under the guidance of Eckles attracted graduate students from all parts of the United States. Research in dairy husbandry was noteworthy for its longtime innovation in basic research.

The general research objective has been to improve dairy cattle and the production and processing of milk and milk byproducts. Some of the significant early research under Eckles' guidance demonstrated that the superior milk-producing cow is not the one with the best digestion. Rather, it is the cow with the inherited ability to consume large amounts of feed and put it toward milk production instead of maintenance. Eckles said, "The main thing a high producer inherits is a good appetite."

Beginning in 1906, a cooperative project between the dairy husbandry department and the dairy division of the U. S. Department of Agriculture to study factors affecting the composition of milk was developed. Under Eckles' supervision, R. H. Shaw, a dairy division chemist, began an exhaustive study of the composition of milk. A series of bulletins on this subject was published between 1909 and 1913.

The research work of assistant professor Leroy S. Palmer had a significant impact on the advancement of science in the United States. Palmer was trained in chemical engineering and chemistry at MU. Palmer joined Eckles and Shaw in 1909, and his thesis for the master's degree in 1910 was largely an outline for his doctoral thesis research.

Palmer used a new technique called absorption chromatography that had been developed in Europe and published by M. S. Trivett in 1906. Palmer's work was to investigate the observations made by dairy farmers that butter from cows consuming summer pasture had deep yellow color but butter from cows consuming stored foodstuffs in winter produced a butter that had a light color. His doctoral thesis was titled "Carotin—the Principal Natural Yellow Pigment of Milk Fat." Palmer's work is significant because he demonstrated the importance of chromatography before most of Europe's leading scientists used the process. Many scientists, including six Nobel Prize winners, used his methods as a foundation for research in agricultural and biological discovery (Gerke et al, 2001).

Ragsdale served as department chairman of dairy husbandry for 42 years from 1919 to 1961. He had a tremendous impact on the department through the faculty he hired and the facilities he helped garner. Ragsdale, affectionately known as "Prof," trained for the bachelor's and master's degrees under Eckles. He is credited with organizing several of the first dairy cow testing associations in Missouri and one of the early purebred bull associations in Missouri.

Ragsdale was instrumental in bringing faculty into the department who made significant contributions in research and teaching, such as Samuel Brody, Charles W. Turner, William H. E. Reid, H. A. Herman, H. D. Johnson, J.R. Campbell, R.T. Marshall and Wendell Arbuckle.

Ragsdale had strength of conviction and philosophy. He refused to eat in a restaurant that did not serve him real butter. He kept a small old placard hanging just inside his office door that read, "If you don't want to be criticized, don't do anything."

Eckles pioneered research on milk composition, factors affecting milk production, digestion of feed for dairy cows and the efficiency of milk production. According to records, Turner and Brody extended these studies.

Beginning in 1927, a highly productive area of research initiated by Turner focused on the endocrinology of milk secretion. This work examined the development of the mammary gland during the early embryonic state, puberty, pregnancy, lactation and involution. These studies also examined the role of the hormone lactogen, which stimulates milk secretion, and several other hormones of the anterior and posterior pituitary glands that play a role in reproduction and lactation. Radioactive isotopes were used to study the rate of thyroxine production by the thyroid gland and the effects on milk yields. The departments of animal husbandry,

dairy husbandry, poultry husbandry and veterinary science cooperated in some of these studies. Several private business concerns and federal agencies helped finance this research.

A part of these studies meant to secure information on the precursors of milk measured the volume of blood and plasma in large animals by the indirect dye method. A method of measuring the volume of blood flowing through the udder was devised, and the gross efficiency of the mammary gland was determined to be more than 90 percent. This means that the energy required to transform precursors in the blood into milk is less than 10 percent of the total energy involved. The knowledge gained concerning the mammary gland, the hormones of the endocrine glands and precursors of milk has been of value to medical professionals, manufacturers of milking equipment and dairy operators.

Turner was a highly prolific writer and has many research bulletins and scientific papers to his credit. He taught an endocrinology graduate course that was highly regarded on campus and was attended by graduate students from various departments.

Brody was hired in 1928. Soon after his appointment, he began a long-term project on the growth and development of domestic animals. His early studies concerned growth, aging, metabolism, productive processes and environment. He studied the effect of age, weight, stage of lactation, plane of nutrition, environment and management practice on the amount of secreted milk. He substantially contributed to the knowledge of the energy and nitrogen metabolism in growing and mature domestic and laboratory animals.

Based on an enormous quantity of basal metabolic data on mature domestic and laboratory animals, it was established that the ratio of metabolism to the 0.73 power of weight is independent of body size. This value of Wb or W^{73} is widely accepted as the metabolically effective body size. Dairy cattle, beef cattle, horses, mules, goats, poultry and rats of various ages during gestation, lactation, work and rest were used in these studies.

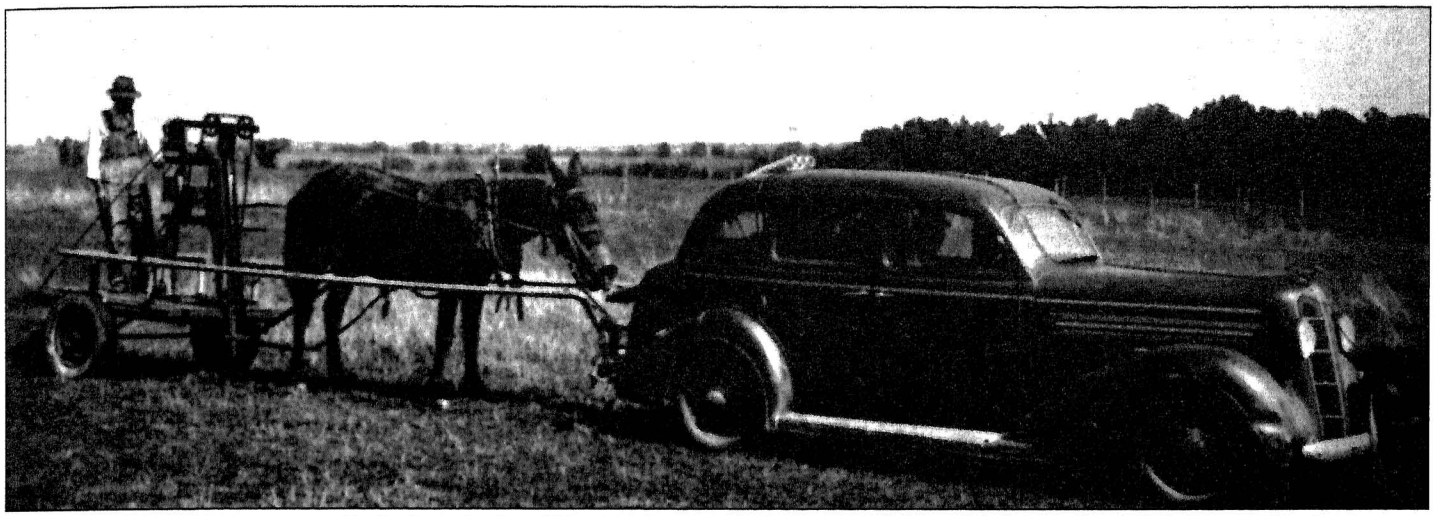
Of major scientific importance was the determination of the energetic efficiency of productive processes, including milk and egg production, work and growth, of these domestic and laboratory animals.

Among the department's productive research programs were studies on growth standards and nutrient requirements for growth, maintenance, milk production and reproduction. Methods were also developed for accurately estimating live weight, condition, efficiency and profitability of dairy cattle. A great deal of basic information in these areas was amassed.

Several departments in the college, a number of federal agencies and the Herman Frasch Foundation cooperated in the conduct and financial support of this work. In 1948 a psychoenergetic, climatic laboratory was constructed on the campus farm, and Brody conducted a series of studies on the physiological response of cattle to climatic and environmental conditions. He published research bulletins and scientific papers, and his 1954 book "Bioenergetics and Growth" is a classic in its field.

Brody's course was very popular. He encouraged class discussions on the principles and theories of bioenergetics. He was interested in the holistic view, and if you wanted an answer to a cellular detail, then Brody would

Professor C.W. Turner and a student measure radioactive iodine in the thyroid gland of a cow to determine thyroid activity. Department faculty were among the first to use radioactive tracers to study metabolism.



This unique equipment was constructed by Professor Brody and his technicians to study the energetic efficiency of the horse and mule during rest, work and recovery from work. This study was part of a series to determine the energetic efficiency of many productive processes, including milk and egg production and work and growth, of several domestic and laboratory animals.

Professor Samuel Brody conducted important research in areas such as growth and development of domestic animals and energy and nitrogen metabolism. He taught a popular graduate course in bioenergetics and growth.

caution against "destroying the total organism's cellular organization." This was the philosophy that he related to Harold Johnson, his last doctoral student who had recently acquired a master's degree in cell physiology. He encouraged Johnson to develop skills in radioisotope physiology so that he could better understand cell physiology and avoid destroying the whole. Johnson went to Oak Ridge and completed the radiobiology course and obtained an isotope usage license before initiating his doctoral research.

In the area of dairy cattle breeding, the dairy department was among the first to develop sire analysis methods that used mature equivalent measures and sire indexes. Several studies on the University Holstein herd indicated that a fairly high level of inbreeding resulted in offspring that produced less milk.

Beginning in 1936, the department, under the leadership of Herman and with assistance from F. F. McKenzie of animal husbandry, began pioneer work on artificial insemination. Physical and biochemical semen characteristics were exhaustively studied. The techniques for collecting, evaluating, processing, storing and using semen in the extended, diluted state were made. In June 1938 the department initiated the second artificial breeding cooperative association in the nation. It was established at Hughesville in cooperation with the Farm Security Administration to service about 500 milk cows from a federal colony farm project. In 1941, the department offered what is believed to be the nation's first college-level course in artificial insemination.

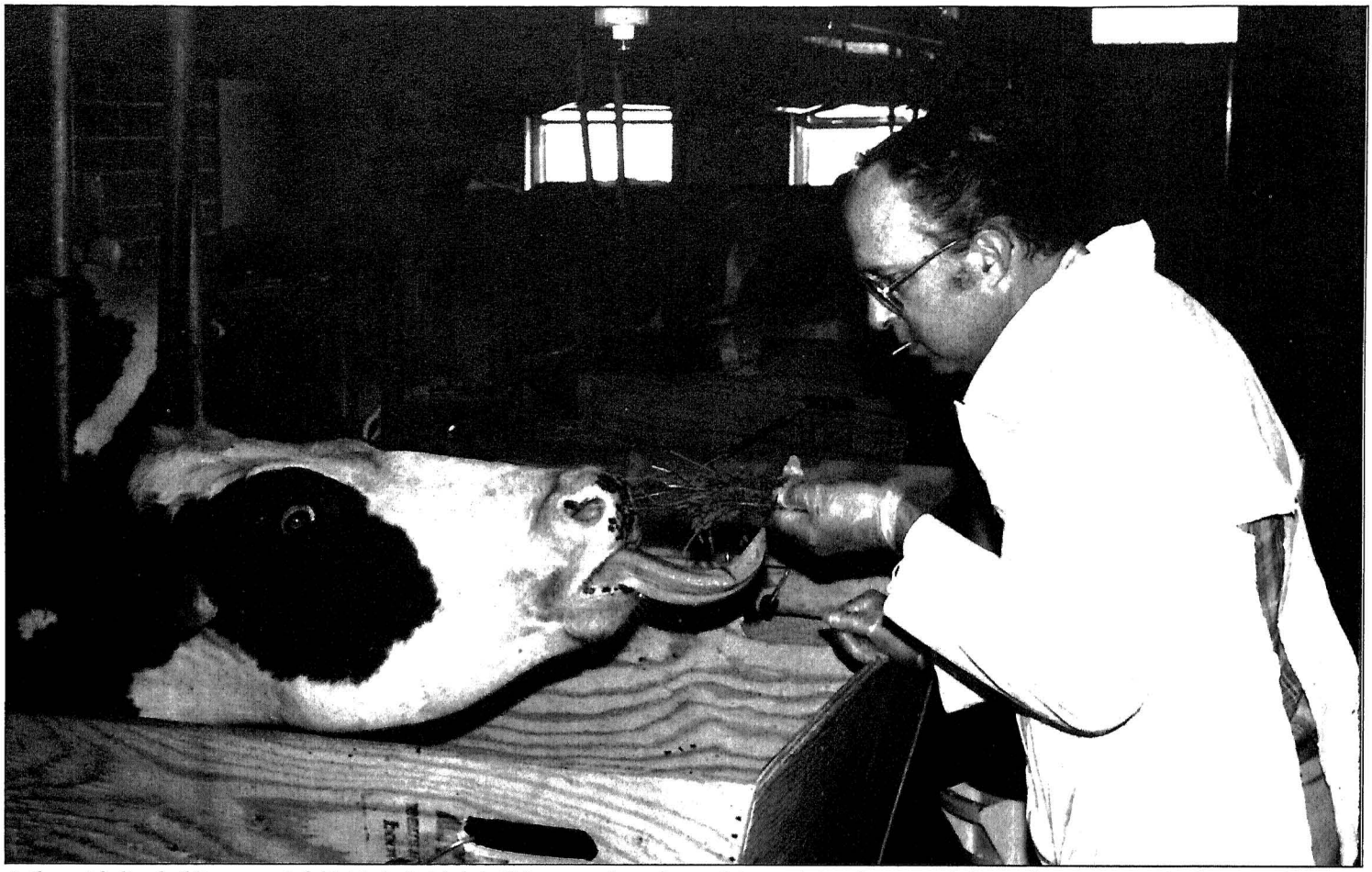
Throughout the history of the dairy husbandry department, research studies fell into the following categories: feeding and nutrition, dairy cattle management, lactation physiology, reproductive physiology, environmental physiology and growth. Much of Eckles' early efforts were directed to improve feeding and management of milk cows. These studies were continued in a wider scope with higher producing cows, modern equipment, new forages and advanced methods of analysis. Various avenues of research took on new dimensions each year.

Nutrition research from 1960 to present

Nutrition research efforts of dairy faculty in the 1960s and 1970s were led by Professor Fred Martz and focused on forage quality and use. The overall goal was to improve pastures and stored forages to better meet the nutrition needs of dairy cattle. Many of these studies were done in collaboration with other departments, especially agronomy, and included long-term grazing experiments at the Southwest Center.

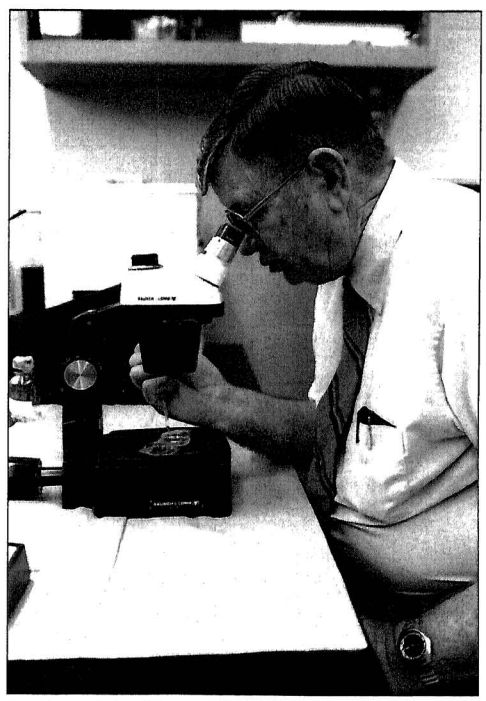
These studies were instrumental in developing improved tall fescue variety I-96 and orchard grass variety Justice. These varieties were developed using dairy heifers as pasture test animals. A comparison of outside storage methods for large round bales of hay analyzed spoilage and suggested corrective measures.

The department's experiments to uncover the relationship of the cell wall to forage quality were among the first in the United States. These studies sought to determine the effect of different factors on rate and extent of ruminant digestion and rate of forage passage through the digestive tract. This group was the first to develop fiber particles that could bind to metal for use in



In the metabolism building, a cow is fed intrinsically labeled alfafa as part of a study on calcium and phosphorus metabolism in lactating cows. The department's groundbreaking studies on calcium and phosphorus availability from forages for lactating cows determined the efficiency of calcium and phosphorus uptake and measured endogenous metabolism.

Cows are housed in the chambers of the Climatic Laboratory for a study of response to ambient temperature-humidity conditions. A climatic laboratory was first proposed by Brody in 1945. A new lab was incorporated into the Animal Sciences Research Center in 1985.



Professor John Sikes evaluates bovine embryos to facilitate a transfer. Researchers in the department were among the first to use embryo transfer technology in dairy cows.

passage studies. These studies led to the innovative use of neutron activation analysis to measure rate of particle passage.

Other studies were done using the Low-Level Radiation Counter to determine changes in body composition of lactating cows during a gestation-lactation cycle.

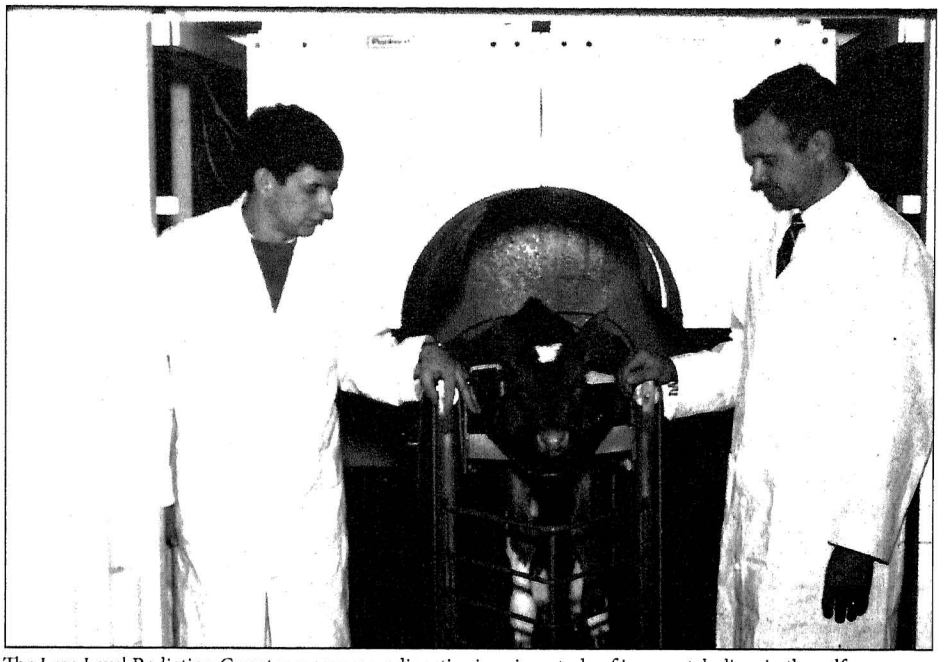
Research to determine optimal levels of selenium supplementation for lactating cows was part of a collaborative effort among several universities. Results were used by the National Research Council to establish guidelines for selenium supplementation in dairy cows. During this period several studies by Campbell evaluated nutritional quality and feed potential of waste papers.

In the 1980s considerable effort was put toward establishing and building the U.S. Dairy Forage Research Center in Madison, Wis, and a U.S. Dairy Forage Cluster was established in the dairy science department.

Nutrition research changed directions. Experiments focused on energy use and body composition of high-producing cows; intake, digestibility and milk production responses of lactating cows fed grasses and legumes at different particle sizes; and the effect of grouping on production.

Martz and coworkers did groundbreaking work to determine calcium and phosphorus availability from forages for lactating cows. In this research, forages containing radioactively labeled calcium and phosphorus were fed to lactating cows at different stages. This work determined the efficiency of calcium and phosphorus uptake and measured endogenous metabolism. Considerable effort was directed at quality and feed value of byproduct feeds, and studies were done to quantify variation in composition and feed value.

Feeding experiments lead by Ron Belyea were carried out to determine intake and production limitations of cows fed different levels of byproduct feeds. This research gave strong support to dairy cattle feeding developments. Only a small proportion of Missouri dairy producers used byproduct feeds in the early 1980s, but by the late 1980s more than half routinely used byproducts. This increase had a major economic and philosophical impact on the industry.



The Low-Level Radiation Counter measures radioactive iron in a study of iron metabolism in the calf.

In the 1990s additional research lead by Belyea evaluated silage additives and high-oil corn fed to lactating cows and high-energy diets fed to growing heifers. A series of studies in collaboration with scientists at the University of Illinois determined composition of waste streams from food processing plants. Long-term feeding studies were carried out to evaluate quality and feed potential of biosolids from a milk processing plant.

Recent studies with University of Illinois scientists characterized processing streams from corn ethanol plants. These experiments provided basic nutritional data on the composition of distillers' grains from small ethanol plants and determined the causes of variation. Nutrient flow was examined for opportunities to modify byproduct composition and improve processing efficiency.

Professor James Spain joined the faculty in 1990. An initial project of his was a national survey of university nutrition extension specialists to determine the extent to which byproduct feeds were used and the general guidelines specialists used when recommending their inclusion rate in diets of dairy cattle.

From there his lab focused on the use of feeds and feed additives in relation to management strategies during periods of stress. A result of these studies was the development of a novel approach to connecting the plane of nutrition during the dry period and early lactation with production and reproduction. He defined the concept of nutritional and metabolic signals imprinting the reproductive tissue of the high-producing dairy cow as the 100 Day Contract with the high-producing dairy cow. This management concept was presented at the Western Canadian Dairy Seminar and later adopted and trademarked by the Upjohn Company.

Recent research has explored the effect of soybean, with its unique fatty acid balance, on the fatty acid balance of dairy cows during both early lactation and periods of heat stress

Physiology research from 1960 to present

The physiology program in the department during this time encompassed the areas of environmental physiology, lactation physiology and

reproductive biology. There was considerable overlap in the studies of these three areas.

The research program in environmental physiology, which was led by Johnson, covered growth and aging metabolism and productive processes and how these processes interacted with the environment. Dairy and beef cattle, goats, mules, poultry and rats at various ages, gestation and lactation stages and levels of physical activity were used as models for the studies.

In particular, the relationships of age, weight, plane of nutrition and stage of lactation to the environment and the relationship of management practice to levels of milk production were studied. The study determined the energetic efficiency of a number of animal species for milk, meat and egg production; growth; and work. Much of the work required a measure of both metabolic hormone levels during stress and change in productive responses to stress.

Controlled environmental studies that measured energy balance, respiratory metabolism, vaporization and other physiological and nutritional measures were possible in the Climatic Laboratory from 1960 to 1984 and in the Brody Animal Climatology Laboratory in the Animal Sciences Research Center after 1984. The ability to study in a controlled environment was not available to researchers in many other institutions.

Professor Ralph Anderson's program in lactation physiology centered on endocrine control of milk secretion. One program emphasis was the role of hormones in mammary gland growth from the fetal state through pregnancy and lactation to involution. The effects of ovarian and placental steroids such as estrogen and progesterone and protein metabolic hormones such as placental lactogen, prolactin, growth hormone and the thyroid hormones on mammary growth and development were determined. Studies also focused on hormones that regulate milk secretion. Both avenues of study determined that the secretion level of the hormones was associated with the level of mammary development and the subsequent milk secretion. It was shown that the hormones had a synergistic effect and that all were needed to obtain maximum milk production.

Studies in reproductive biology encompassed the areas of ovarian function, embryonic development and embryo transfer, semen evaluation, cryopreservation and the interaction of reproductive processes and nutrition. Studies associated with ovarian function focused on follicular growth, particularly follicular dynamics during the estrous cycle and the mechanisms regulating follicular development and estrus.

Also of interest were the dynamics and mechanisms associated with development of ovarian follicular cysts. Cows with cysts are infertile as long as the condition persists. It was shown that alterations in gonadotropin secretion, specifically high basal LH secretion with no preovulatory surge of LH, preceded development of cysts and that cysts exhibited variable dynamics of development and lifespan. After elucidation of the structure of gonadotropin releasing hormone, scientists in the dairy science department and veterinary medicine conducted studies to show that GnRH was an efficacious treatment for cysts. The FDA approved GnRH as a treatment of cysts. Other studies of ovarian function examined mechanisms that regulate subnormal luteal function.

John Sikes' program in embryonic development investigated improved methods of freezing embryos that would maintain fertility. Charles Merilan's program in semen evaluation studied characteristics of semen under various environmental conditions. Studies were also initiated during this time period to determine the effects of nutrition on the hypothalamic/pituitary axis and fertility in dairy animals.

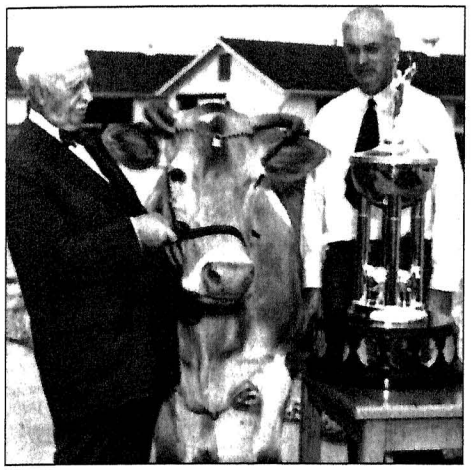
Four famous cows

The department has been associated with four famous cows. In June 1908, a Jersey cow named Pedro's Estella completed a world record for the 3- and one-half-year-old class. She produced 11,063 pounds of milk and 695 pounds of butterfat in 365 days of lactation. This cow was related to the four Jersey cows purchased by Sanborn in 1887. The accurate record keeping Sanborn established authenticated this world record.

Missouri dairying and the department received worldwide attention in 1910 when a Holstein cow purchased from E. M. Moore of Cameron, Mo, Chief Josephine 64867, produced 26,861.5 pounds of milk and 740 pounds of butterfat in one year. "Old Jo," as she was fondly known, held the world's record for 30-, 60- and 90-day milk production, and she came in second for yearly milk production. In 1911 she traveled by train more than 4,000 miles and was viewed by more than 100,000 people. Old Jo's granddaughter, Campus Josephine Galaxy, had six daughters and five sons. Old Jo helped build the herd's national prominence and is considered the cow that helped make Missouri famous as a dairy state. One student told Eckles he wanted to attend the University because of Old Jo's records.

In January 1952, J. C. Penney gave the Foremost Guernsey herd to the University. One aged herd member, Foremost Quantity, was awarded the Liebers trophy for the most lifetime milk production of any other cow of the same breed. Her lifetime record was 137,889 pounds of milk and 6,294 pounds of butterfat in eight lactations.

The fourth famous cow has roots to a former student of dairy husbandry. Robert F. Thomson Jr. attended the University for two years. He persuaded his advisor, Harry Herman, that he should take only dairy husbandry classes that emphasized breeding and herd management. After two years he informed his advisor that he was going



J.C. Penney, Foremost Quantity and professor A.C. Ragsdale with the Otto Liehers trophy for lifetime milk production. Penney donated Foremost Quantity and the rest of her herd to the University. Her lifetime record was 137.889 pounds of milk and 6,294 pounds of butterfat

to return home near Springfield, Mo and farm with his father. He said he wanted to become a good dairy farmer and a successful dairy cattle breeder.

He and his wife, Marianna, developed the nationally known herd of Robthoms Holstein Cattle. In 1993 a cow in that herd, Robthom Suzet Paddy, set a world record for milk at five years old. Her record was 59,300 pounds of milk, which is about 30,000 quarts; 2,397 pounds of fat; and 2,038 pounds of protein.

Martz wrote about a visit he made to the Thompson's Robthom Farm.

"It was always my practice to take my dairy production class on a field trip each semester to visit several farms. During one of these trips we visited the Springfield area and Robert and Marianna Thompson's Robthom Farm. It was my perception that Robert looked after the broader aspects of breeding, farm management and herd management. It was Marianna who looked after the day-to-day care of the herd. I can still vividly remember standing in the parking lot of their farmstead with the students and Marianna talking about how to get cows to stop giving milk at the end of their lactation. It seemed that some of their cows had such a propensity to produce milk that they would not dry off in preparation for next lactation. It was one of these cow families that later produced the world record milk producing cow Robthom Suzet Paddy."

Dairy manufacturing[2]

Dairy manufacturing and processing were always an integral part of the department.

Eckles was trained as a bacteriologist, so he had interests in milk processing as well as milk production. This arrangement continued until 1967 when the Department of Food Science and Nutrition was established. Professors Edmondson, Marshall and Shelley were transferred into that department.

Department research has frequently focused on the manufacture of dairy products, merchandising and quality control measures involving bacteriological studies. The first studies in these focus areas began in 1894 and were continued by Eckles, Shaw, Palmer and assistant professor Arthur S. Dahlberg.

The department sold milk, butter, cottage cheese and ice cream on campus from the early 1900s to 1972. Fluid milk was the main item supplied to campus cafeterias.

A retail store in Eckles Hall sold fluid milks, cottage cheese, cultured buttermilk, butter and vanilla, chocolate and strawberry ice cream. Before 1920 the department's Saturday butter route delivered throughout Columbia in a horse-drawn milk wagon. After fiscal restraints and deterioration caused the plant to close in 1972, the University stopped selling dairy foods.

In 1919 W.H.E. Reid was hired to head the dairy manufacturers and products division. He also supervised the operation of the University creamery where dairy products were made for sale. A University of Wisconsin graduate, Reid carried on a vigorous program in teaching and research, and he maintained a strong working relationship with industry leaders throughout the nation. He earned a master's from MU in 1920.

Reid actively participated in the Southern Association of Ice Cream Manufacturers. He was secretary to the Missouri Ice Cream and Milk Institute for 45 years, secretary and treasurer of the Missouri Butter and Cheese Institute for 25 years, secretary of the St. Louis Dairy Technology Society for 15 years, secretary of the Kansas City Dairy Technology Society for 14 years and director and secretary of the American Dairy Association of Missouri for 10 years. In 1995 the Missouri Dairy Hall of Honors recognized Reid with its Pioneer Dairy Leadership Award.

Reid's projects included ice cream quality and merchandising, milk and milk product composition, the quality and storageability of cottage cheese, whey solids and cultured dairy products, dairy plant operations and dairy plant automation. Bacteriological studies were made of dairy products and strains of bacteria from the bovine mammary gland.

The professors that assisted Reid in the course of these investigations were Earl R. Garrison, Edmondson, Marshall, Arbuckle, Shelley and others.

Techniques were developed for measuring the size and type of ice crystals formed in ice cream. A direct correlation between ice crystal size and relative smoothness of ice cream texture was demonstrated. A technique was also developed to measure the type and size of both alpha and beta lactose crystals in ice cream. The type and size of the crystal was correlated with the degree of sandy defect in ice cream.

Formulas for ice cream were developed that substituted sucrose for 25 percent of the corn sugar. Improved quality of body and texture was achieved with savings in ingredient costs as well. Studies on the use of liquid sugars, whey solids, stabilized nonfat milk solids and emulsifiers were conducted, and the technique of time-lapse photography was used to

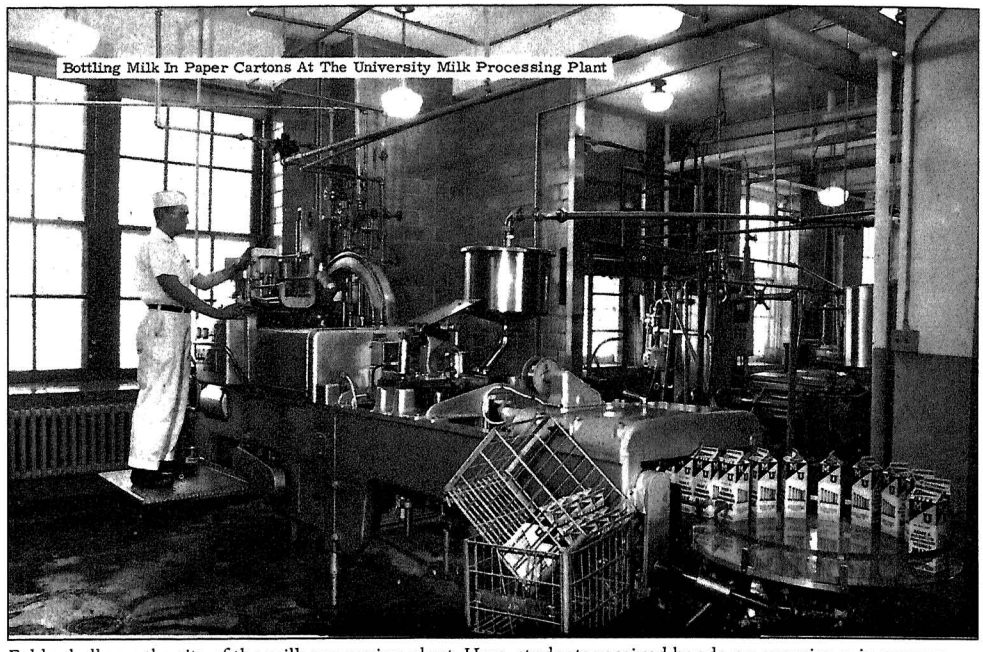
[2] Special thanks is extended to Dr. Robert Marshall, professor emeritus of the Department of Food Science and Nutrition, for supplying most of the material for this section.

determine ingredient influence on differences in melting rate.

Dairy manufacturing is best remembered for accomplishments in the area of ice cream. Ice cream teaching and research at the University had its significant beginning by Reid in the early 1920s.Wide recognition of his ice cream research came when he and his graduate student, Arbuckle, published on the texture of ice cream using light microscopy before World War II. Edmondson, a graduate student at the time, assisted the research.

This was the first time that ice crystals, air cells and lactose crystals were displayed in photographs. The work was done in a -20 F environment. One of the pictures is published in the major reference book "Ice Cream," written by Marshall and Arbuckle. Arbuckle went on to become known as "Mr. Ice Cream" in the U.S. and taught at the University of Maryland for most of his teaching and research career. He later became a major consultant for Baskin Robbins ice cream company. Reid retired in 1964 and was replaced by Marshall, who joined the department in 1960 after completing his doctorate under Edmondson.

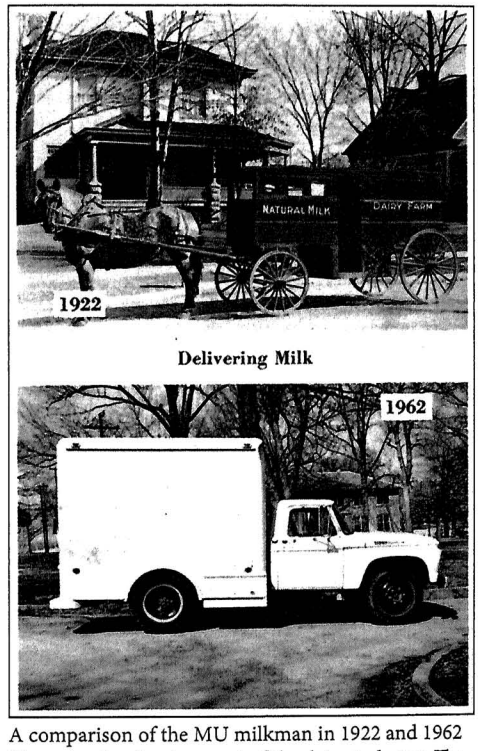
The dairy plant had been renovated and a new continuous creamery package 100gph ice cream freezer was purchased, but little research was done on ice cream after Reid's retirement. In 1989 the Arbuckles started an endowment to support research, teaching and outreach in frozen dairy desserts. The Arbuckles, the dairy industry and friends of the department contributed about $160,000 to the endowment. Marshall was responsible for organizing a program to emphasize ice cream research and finding a renowned professor to revive the ice cream research program. Marshall identified three likely candidates, Bruce Tharp of Germantown Manufacturing in Pennsylvania, David Smith of the University of Minnesota and Robert Baer of South Dakota State University, and got them all better salaries; however, the Arbuckle Endowment Advisory Committee told Marshall that he should set aside his cheese ripening research and take the position himself.



Eckles hall was the site of the milk processing plant. Here, students received hands-on experience in processing milk and ice cream. The dairy department sold milk, butter, cottage cheese and ice cream on the University campus from the early 1900s to 1972.

For new research the University renovated a food processing pilot plant into an ice cream pilot plant. A complete processing plant on a stainless steel base was purchased from Processing Machinery and Supply Company in Philadelphia. It included two 15-gallon batching and pasteurizing tanks; a high-temperature, short-time pasteurizer; homogenizer; and a continuous ice cream freezer. The plant was capable of 30 gph throughput. A variegating pump was purchased as well. A 40-quart, used Emery Thompson batch ice cream freezer was purchased, and Anheuser Busch of St. Louis gave the department an eight-quart batch freezer and a small chest freezer.

The Kelvinator company contributed two dipping cabinets and a display cabinet and offered a discount on a hardening cabinet. The Sealright Company, a package supply firm of Kansas City whose president, Major Holt, was a graduate of the College of Business and Public Administration at MU and whose sales manager, Jerry Walkenbach, was from Washington, Mo, provided the design and plates for printing the ice cream cartons and the machine for making the bulk containers in-house. Beck Flavors, a St. Louis company whose technical director earned a doctorate in food science, supplied free vanilla for many years.



Delivering Milk

A comparison of the MU milkman in 1922 and 1962 illustrates the development of the dairy industry. The dairy husbandry department was key to this development through its innovations in product development and processing

The pilot plant, an adjacent analytical laboratory and the Bucks Ice Cream Parlor were opened in 1989. Many other firms assisted the program by using the laboratory's technical services

and providing small grants and gifts. The Missouri Dairy Products Association gave money to the Dairy Products Evaluation Team, which helped students become proficient in sensory analysis of ice cream and related dairy foods.

The new ice cream research program was organized under the umbrella objective of formulating frozen desserts to meet the nutritional needs of consumers. Research projects replaced milk fat with carbohydrate and protein ingredients such as maltodextrins, particulated whey proteins and vegetable gums or fibers. Because of the department's strengths in sensory analysis, flavor chemistry and food engineering, graduate students were encouraged to focus on those areas when choosing their research projects. Researchers gained grant support because of these strengths and industry interest in low-calorie and low-fat ice cream products.

A major contribution by Shelley and Marshall to the program was Tiger Stripe ice cream, a gold-colored, French vanilla ice cream variegated with a black stripe and packaged in a black and gold container. Tiger Stripe ice cream was sold at Schnuck's local supermarket, Flat Branch Bar and Grill and two private ice cream shops, but most of the sales were made through Buck's Ice Cream Shop. This product is the most popular of the 16 different types of ice cream, frozen yogurt and sherbets regularly offered.

From 1960 to 1975, the food science faculty and the St. Louis section of the Institute of Food Technology cosponsored annual food technology conferences on the MU campus. Up to 200 participated. The institute established four undergraduate scholarships and one graduate scholarship for the department's students.

In 1975 Campbell and Marshall cowrote a general dairy science textbook, "The Science of Providing Milk for Man," that was published by McGraw Hill Book Company. No general dairy science textbook has been published since. It has been translated into Russian and Polish.

The Association of Missouri Dairy Organizations, the Missouri Dairy Association and the Missouri Dairy Hall of Honors Foundation

The Association of Missouri Dairy Organizations was organized in 1963 with most of its development lead by John Cooper. It was Cooper's vision that AMDO would bring attention to Missouri's dairy industry leaders. The first Dairy Leadership Award was presented to Herman in 1972.

The awards program was expanded to include the Breeder Award, Pioneer Award, Meritorious Service Award and the Memorial Endowment Award. On Dec. 9, 1988, AMDO and the Missouri Dairy Association were combined, and the Missouri Dairy Hall of Honors Foundation was formed. The purpose of the Foundation was to maintain a Dairy Hall of Honors at MU to honor outstanding leadership in the Missouri dairy industry; recognize outstanding achievements among dairy cattle breeders, milk producers, dairy processors and others intimately involved in the Missouri dairy industry; and provide an archive of historical records and memorabilia of the Missouri dairy industry. AMDO currently maintains the Hall of Honors in the Animal Sciences Research Center. The Hall of Honors was renovated in 2005 with a loan from Wilbur Feagan.

Past, present and future

Dairying was widespread in Missouri at the beginning of the 20th century. Every farming community across the state had many small dairy herds, and the state's milk cows totaled over 700,000. Milk cow numbers peaked to about one million in 1950 but have declined steadily since to less than 200,000 cows. This decline was a result of both a shift of livestock producer interests to beef and a shift of the dairy industry to the giant confinement dairies in the southwest. A reduction in the size and effort of the dairy science program has accompanied this decline. Several interested groups in Missouri are attempting to attract new producers to the state. During the past 10 years a small but growing number of pasture-based dairies have been established in the state. It is possible that rebuilding the dairy industry in Missouri will be dependent on pasture-based production units.

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A class on poultry takes place before the establishment of the poultry husbandry department.

The Department of Poultry Husbandry

A March 1906 publication by the College of Agriculture titled "Missouri Farmer" declared Missouri a poultry state. In 1900 Missouri ranked third among all states in the amount of dressed poultry and eggs sold. By 1905 the state had forged ahead of all other states with $32 million poultry products sold. As Missouri was continuing to be an economically important poultry state, Dean F.B. Mumford worked to establish a Department of Poultry Husbandry. This was finally accomplished in 1911, and Harry L. Kempster was appointed assistant professor and department chair.

Mumford had offered Kempster, then on the poultry staff at Michigan State, the following comments as inducements for his acceptance: "Missouri is one of the greatest poultry states in the Union. The value of our poultry produce ($40 million) exceeds in value many of our most important agricultural products (hogs, $6 million; meat cattle, $25 million). You understand this is a new department. You will have the opportunity to build from the ground up. We are prepared to secure efficient equipment for the department. We have a stone livestock building which is our purpose to use largely for poultry work. The poultry department will be a distinct department, in no way connected with the Department of Animal Husbandry. The position will be assistant professor in charge of the poultry department of the University of Missouri at a salary of $1,750 a year."

After Kempster's acceptance, the board gave support to the program, as reflected in a letter to Kempster dated July 5, 1912, from the secretary of the board. They assigned the Porter Street Poultry Farm to the department for teaching and research.

From 1911 to 1917 Kempster maintained a one-man department with the help of student assistants. During these years Kempster established the poultry farm, organized and taught six courses, conducted a number of extension programs and began several research projects. An extension specialist, T. S. Townsley, was hired in 1917, and in 1921 E.W. Henderson was appointed instructor in the department.

Facilities

Building T-14 was secured from Camp Crowder after World War II and was converted into offices, laboratories and classrooms for students and staff of the poultry department. The South Poultry Farm, which originally consisted of 80 acres, was assigned to the department in 1944, and the Rocheford Turkey Research Farm, northeast of Columbia, became available for development as a turkey research facility in 1956. A poultry nutrition and a poultry physiology building were constructed in the agricultural research park in 1965. Space in two laboratories in the Animal Sciences Research Center, built in 1973, was assigned to the poultry nutrition and poultry physiology research programs.

The Board of Curators officially changed the name of the Department of Poultry Husbandry to the Department of Poultry Science in 1980. The merger of all poultry work into the Department of Animal Sciences took place in 1983.

Poultry farm superintendents, foremen, technicians and research specialists.

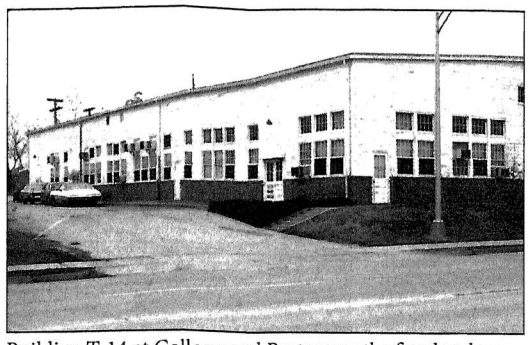
H.A. (Zeke) Henly was the first caretaker of the Porter Street Poultry Farm. Wilson Cramer, an undergraduate, was caretaker from 1915 to 1916. H.L. Peabody served as superintendent for many years and was succeeded by James Forward. Forward, George Rector and Norman Holman were caretakers between 1940 and 1983.

Foremen at the South Poultry Farm were Claude Howard from 1950 to 1960 and Ralph Poe from 1961 to 1985.

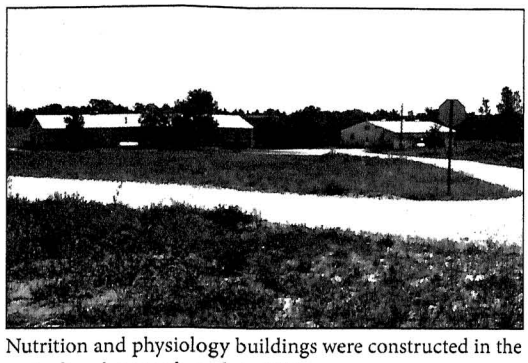
The foremen at the Rocheford Turkey Research Farm were Ralph Monroe from 1957 to 1959, Ronald Paschang from 1959 to 1962, Edgar Drane from 1962 to 1976, Kirk Hankins from 1976 to 1978, James Travers from 1978 to 1979, Frank Ireland in 1979 and Keith Fletcher from 1979 to 1980.

In 1965 Donald Toalson was employed as technician in the poultry physiology building, and Rex Hess succeeded him in 1971. Other technicians were Neal Miller from 1973 to 1976, Ken Koelkebeck from 1976 to 1981 and Fletcher from 1981 to 1986.

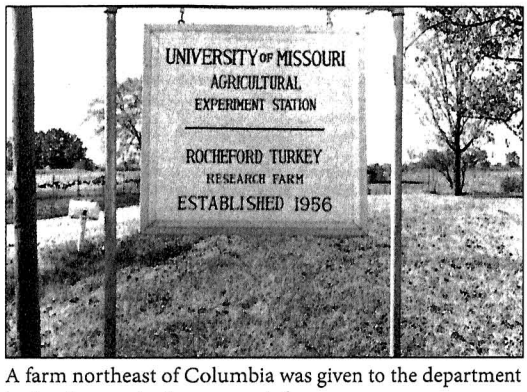
Leonard Schulte was employed as technician in the new chick nutrition building from 1965 to 1978 and was succeeded by James Rhoades in 1978.



Building T-14 at College and Porter was the first headquarters for the department.

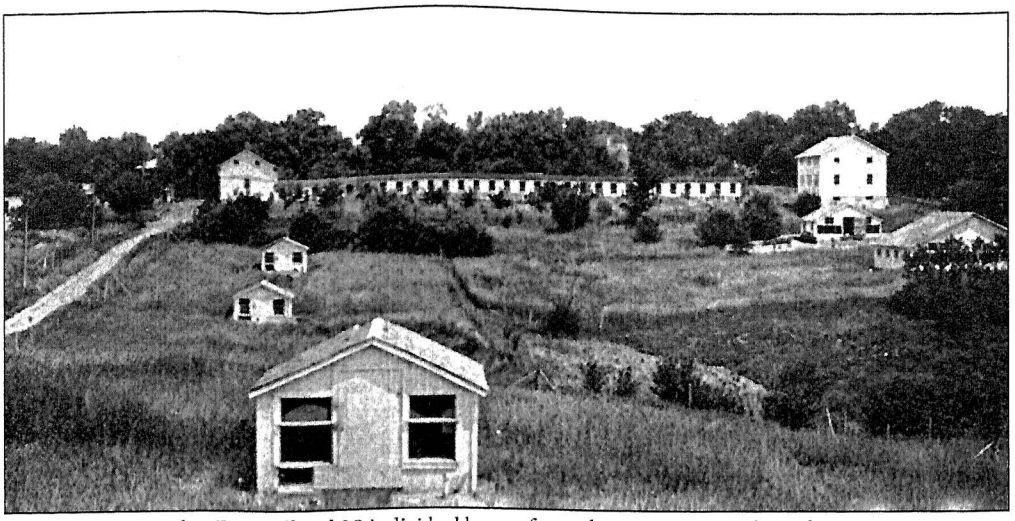


Nutrition and physiology buildings were constructed in the agricultural research park in 1965.

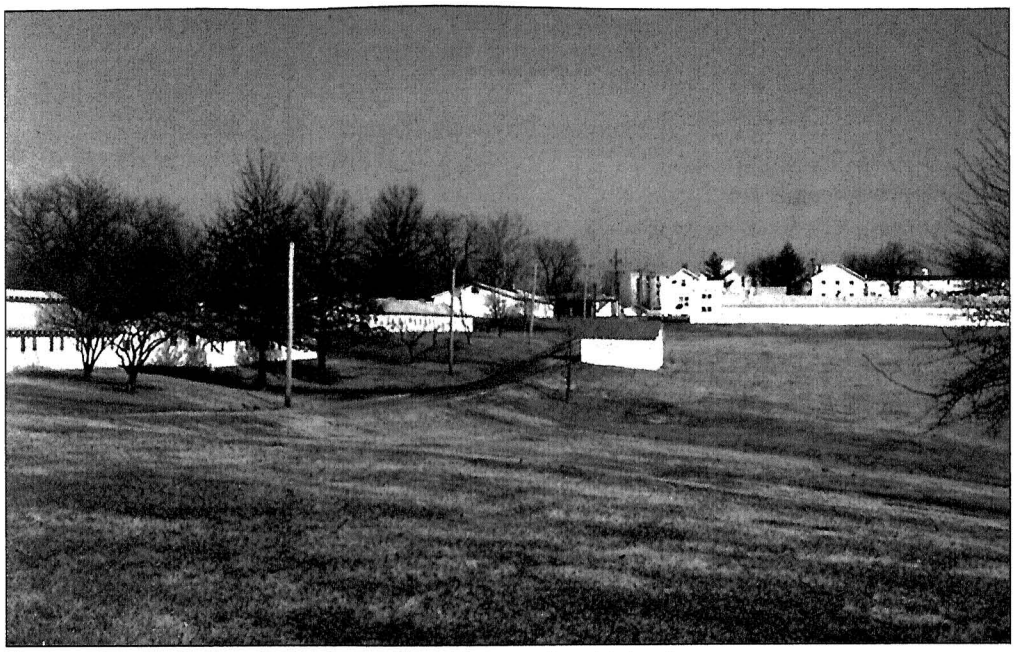


A farm northeast of Columbia was given to the department to develop as a turkey research farm.

The 80-acre South Poultry Farm was renamed to the Kempster-Funk Poultry Farm, pictured above.



The Porter Street Poultry Farm offered 29 individual houses for student instruction in the mid-1920s.



The Porter Street Poulty Farm in 1986 was still used for research and instruction.

Mike Russell succeeded Rhoades in 1982.

In 1966 Jean Glauert was appointed technician for the egg research laboratory.

Research specialists were Tom Kilburn from 1969 to 1974, Jess Lyons from 1972 to 1984, Don Carman from 1974 to 1977, Wayne Reichert from 1977 to 1978, Norris Waite from 1978 to 1979, Mary Schafer in 1979, Lenore Albee from 1980 to 1982, Robert Lauxen from 1982 to 1984 and Clayton Hawkins from 1984 to 1986. Russell Smith worked with chickens and turkeys on the farms from 1954 to 1984.

Teaching

Faculty

The following faculty and staff members served the department.

- **H. L. Kempster** (B.S. 1909 Michigan State College, M.S. University of Wisconsin)

Kempster was hired by Mumford in 1911 as an assistant professor and was made professor in 1919. He served as chairman of the department for 43 years until he retired in 1954 at age 70. Kempster began the teaching, research and extension work and established the Porter Street Farm. He was assisted by instructors M.A. Seaton from 1929 to 1930, J.E. Parker from 1934 until 1940 and Lester Williams from 1939 until 1941.

Kempster was a member and president of the Poultry Science Association and received their fellow award in 1938. He was a charter member of the American Poultry Historical Society and was named to the Poultry Hall of Fame in 1956. He maintained his association with the poultry department for 51 years until his death in 1962.

- **E.W. Henderson** (B.S. Poultry Husbandry 1922, M.A. 1924 University of Missouri)

Henderson was an instructor in 1921, an assistant professor in 1924 and an associate professor of poultry husbandry in 1930, at which time he became chairman of the poultry department at Iowa State College. He shared teaching and research duties with Kempster and coached the poultry judging team from 1921 to 1926 and again in 1928 and 1929.

- **E.M. Funk** (B.S. Southeast Missouri State Teacher's College, M.A. 1927 University of Missouri, Ph.D. 1951 University of Wisconsin)

Funk came to MU as an instructor of poultry husbandry in 1927 and received his master's degree. In 1930, after two years as an assistant professor at Pennsylvania State College, he returned as an assistant professor and researcher of poultry husbandry until 1954. He taught courses in poultry judging, incubation and brooding, turkey production, poultry marketing and hatchery management. Funk trained 14 poultry judging teams between 1930 and 1946 and coached national championship teams in 1941 and 1946. He received a doctorate in 1951 from the University of Wisconsin. He served as chairman from 1954 to 1966 and retired as professor emeritus.

Funk wrote numerous circulars, bulletins and papers on poultry husbandry and co-wrote "Poultry Science and Practice" with A. R. Winter and "Hatchery Operation and Management" with M. R. Irwin. He worked

directly with poultry industry groups at the state, national and international levels. He organized short courses for Missouri poultry and egg producers, turkey breeders and growers, commercial hatchery workers and poultry and egg processors.

Funk served as secretary of the Missouri Poultry Improvement Association from 1932 to 1963 and director of research for the American Poultry and Hatchery Federation from 1949 to 1959. He was a member of the governing body of the World Poultry Science Association for 22 years. He served the Poultry Science Association as director from 1936 to 1938 and from 1952 to 1954, as secretary from 1944 to 1948, as vice-president from 1949 to 1951 and as president from 1951 to 1952. He served as president of the American Poultry Historical Society from 1971 to 1973.

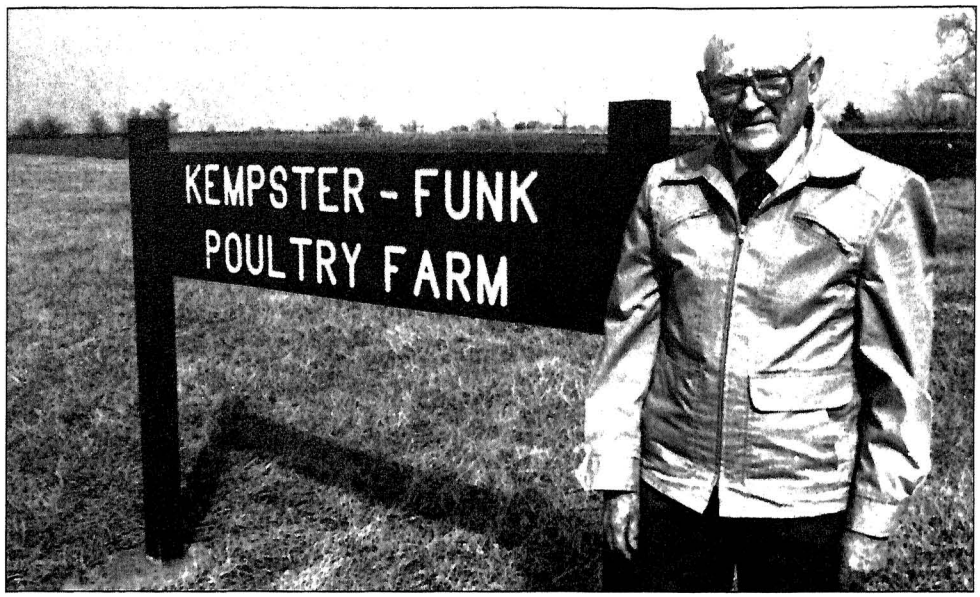
Funk won several awards, including the Poultry Science Research prize in 1942, the Christie award for egg research and Poultry Science Association awards for both teaching and research. He was named fellow of the Poultry Science Association in 1957.

- **M.R. Irwin** (B.S. Agriculture 1934, M.A. 1941 University of Missouri)

Irwin instructed in the department from 1939 to 1943 and was assistant professor from 1946 to 1947. He assisted poultry judging coaches and conducted poultry feeding experiments. Irwin co-wrote "Hatchery Operation and Management" in 1955 while serving as president of Colonial Poultry Farms Inc. of Pleasant Hill, Mo.

- **H.V. Biellier** (B.S. Agriculture 1943, Ph.D. 1955 University of Missouri)

Biellier joined the department in 1946 as an instructor. He left in 1950 to serve as captain in the U.S. Army, but returned as instructor in 1953. After receiving his doctorate in physiology in 1955, Biellier was named assistant professor. He became associate professor in 1958 and professor in 1969, and since 1987 he has been professor emeritus. He taught courses in poultry science and avian physiology.



E.M. Funk joined the department in 1927. He taught courses in poultry judging, incubation and brooding, turkey production, poultry marketing and hatchery management and trained 14 MU poultry judging teams.

He was responsible for the development of the Rocheford Turkey Research Farm in 1956, and he managed the turkey cage facilties at Porter Street Farm and the physiology building. His long-term research objective was to determine the limiting effects of environmental and physiological parameters on rate of egg lay, fertility and hatchability of poultry.

- **Q.B. Kinder** (B.S. 1932, M.S. 1933 University of Missouri)

Kinder joined the department as assistant professor in 1947. He taught poultry farm management and poultry judging. With student help he designed and constructed several poultry buildings. Kinder spent two years on poultry development in India under the University's AID contract. He retired as professor emeritus in 1972.

- **J.F. Forward** (B.S. Poultry Husbandry 1933, M.S. Poultry Husbandry 1935 University of Missouri)

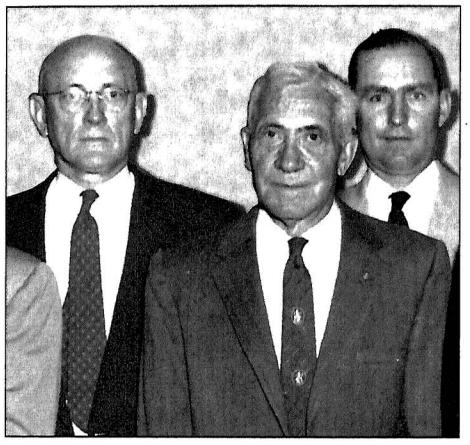
Forward joined the department in 1936 as an assistant instructor. In 1948 he became instructor, and from 1954 to 1986 he worked as a technician. He served as foreman of the Porter Street Farm. Forward worked closely with Funk on studies of multiple plane turning of eggs during incubation and effects of preincubation holding temperature on hatchability of chicken eggs. He also worked closely with Biellier on fertility and hatchability of chicken and turkey eggs.

- **J.E. Savage** (B.S. 1943 University of Arkansas, M.S. Agricultural Chemistry 1948 University of Missouri, Ph.D. 1955 University of Missouri)

Savage worked for four years for the poultry feed industry after earning his master's, but he returned to MU in 1954 as an instructor in poultry husbandry. He received a doctorate in agricultural chemistry in 1955 and was appointed assistant professor in the department. He served as department chairman from 1966 until 1983 when the department merged into the Department of Animal Sciences. He taught courses in nutrition, acted as graduate advisor for students in poultry nutrition and conducted research in avian nutrition. His research interests were in the interrelationship of amino acids, lipids, trace minerals and unidentified factors in growth and reproduction.

He was a member of the American Institute of Nutrition, World Poultry Science Association and Poultry Science Association, for which he served as president in 1974 and was named fellow in 1980. During the 1970s he served as a consultant to the U.N. Food and Agriculture Organization in Poland.

Poultry faculty in 1985: (left to right) J.M. Vandepopuliere, Q.B. Kinder, A.B. Stephenson, H.V. Biellier, J.E. Savage, E.M. Funk and G.S. Geiger.



E.M. Funk, H.L. Kempster and J.E. Savage served as the department's only three chairs between 1911 and 1983.

He was also a member of numerous divisional committees, including the college of agriculture executive committee, which he chaired in 1971 and 1980; the Department of Animal Sciences, for which he was computer representative from 1981 to 1990; college of agriculture animal care committee, which he chaired from 1984 to 1986; and the animal science research facility planning committee from 1961 until 1982. Savage retired as professor emeritus in 1990.

- **W.D. Russell** (B.S. Agriculture 1948, M.S. Extension Education 1959 University of Missouri)

Russell served as assistant county agent in Johnson County and county agent in Miller County before becoming a state extension poultry specialist in 1953. He did extensive work with the Missouri turkey, broiler and game bird industries. His work covered management and market development. Russell was instrumental in the organization of state poultry producer and industry organizations, and he provided leadership as an ex officio member of many commodity groups. He was the winner of the Pfizer Extension Teaching Award in 1964. Russell retired in 1978.

- **A. B. Stephenson** (B.S. 1933 Virginia Polytechnic Institute, M.S. 1934 Rutgers University, Ph.D. 1949 Iowa State University)

Stephenson joined the department in 1953. He directed one master's and three doctoral programs. He finished the last eight years of a 20-year experiment on recurrent selection with chickens and afterward worked with a control turkey population from the Ohio Experiment Station to develop high and low hatchability lines. He also conducted an experiment to compare cage and floor management for turkey breeders. He retired as professor emeritus in 1983

- **O.J. Cotterill** (B.S. 1947, M.S. 1948, Ph.D. 1954 Ohio State University)

Cotterill joined the department in 1956. With help from his 11 master's and 12 doctoral students, he researched egg science and technology. He was a nationally respected authority on egg pasteurization and drying, salmonella problems of poultry and eggs and the chemical, nutritional and functional properties of egg proteins, especially lysozyme. He co-wrote "Egg Science and Technology" with W. J. Stadleman. He retired as professor emeritus in 1987.

- **G.S. Geiger** (B.S. Agriculture 1950 University of Missouri, M.S. Extension Education 1964 University of Missouri)

Before joining the staff, Geiger was assistant hatchery manager for Swift and Company and inspector for the Missouri Poultry Improvement Association. In 1957 he became a state extension poultry specialist and served until retirement in 1986. He was also associate professor of poultry. His areas of specialty were egg production and management and youth poultry programs. He was the first recipient of the Meritorious Service Award for 4-H youth workers in recognition of his development of the 4-H incubation project that has reached thousands of youths. He was awarded the title professor emeritus in 1987.

- **K.A. Holleman** (B.S. 1958 Texas A&M, M.S. 1962 University of Nebraska, Ph.D. 1971 University of Missouri)

K. A. Holleman joined the poultry department in 1966 as an instructor. His primary responsibility was teaching.

- **J.M. Vandepopuliere** (B.A. 1951 Central Missouri State College, M.S. 1954 University of Missouri, Ph.D. 1960 University of Florida)

J. M. Vandepopuliere joined the department in 1972. His research program emphasized processing and using

numerous agricultural and industrial byproducts, such as hatchery residue, eggshells, spent hens, on-farm dead, litter and distillers' dried grains as feed ingredients or fertilizers. He supervised 15 master and five doctoral degree candidates. He retired as professor emeritus in 1997.

Courses

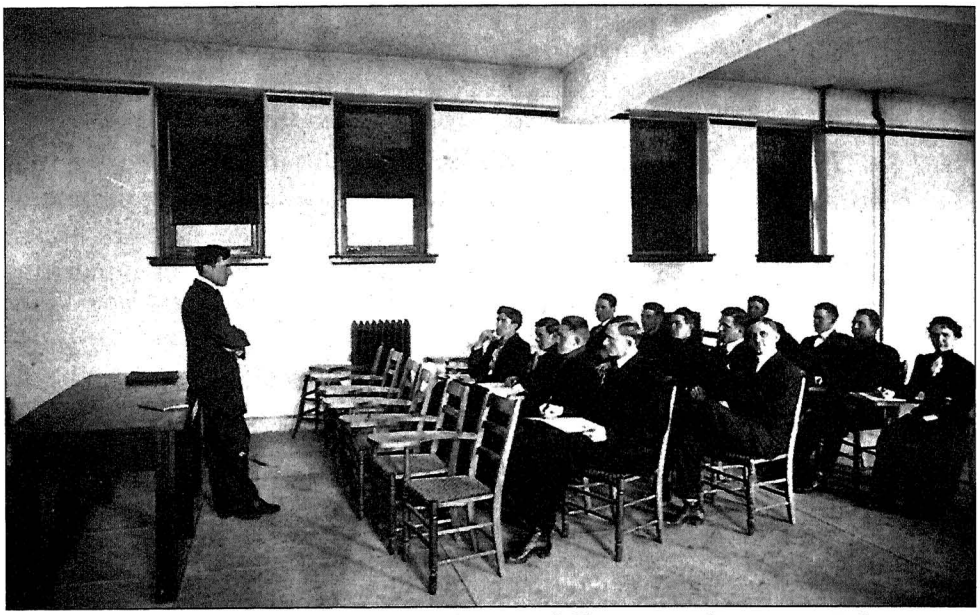
Kempster these courses during the 1912-1913 academic year: 1a elementary poultry raising, 2b elementary poultry raising, feeding practice, poultry judging, poultry farm management and incubating and brooding practice.

There have been many course changes over the years. The following were the courses offered by the department during the 1966-1967 academic year:

Course	Staff
101 Poultry Science	Kinder
201 Poultry Judging	Kinder
300 Problems	Staff
301 Egg Technology	Cotterill
303 Poultry Breeding and Incubation	Stephenson
304 Turkey Production and Management	Biellier
306 Poultry Meat Technology	Cotterill
308 Poultry Feeding and Nutrition	Savage
309 Avian Physiology	Biellier
390 Field Training	Staff
400 Problems	Staff
410 Seminar	Staff
420 Design and Analysis in Experiments	Stephenson
423 Genetics of Populations	Stephenson
430 Advanced Poultry Products Technology	Cotterill
450 Research	Staff
490 Research	Staff

The department offered a beginner's correspondence course in poultry production for more than 30 years. Several hundred students have completed this three-hour course for credit.

Enrollment in poultry courses has varied widely over the years. Enrollment peaked after World War II when 400 students enrolled in the various poultry classes. A total of 7,811 students attended two main collegiate courses between 1911 and 1954. An additional 1,767 attended short courses.



The first course was taught by Kempster in 1912 and was attended by 11 men and two women. Early instruction was primarily by lecture, but the poultry farm allowed students to learn in the laboratory.

A program leading to the doctorate in poultry husbandry with specialization in poultry breeding, nutrition, poultry products or physiology was approved in 1957. In 1967 Cotterill transferred to the newly created food science and nutrition department, so graduate teaching and research programs in poultry products moved to that department.

Graduates

The poultry department claims 237 graduates who majored in poultry husbandry or poultry science between 1911 and 1986. Some of these students earned more than one degree. There were 171 bachelor's, 95 master's and 34 doctorates awarded during these years. Thirty-five international students earned degrees between 1911 and 1986.

These graduates' careers took many routes. Many had distinguished careers as deans or chairs of poultry departments or as extension poultry specialists, among others.

Careers of poultry graduates

Career	No.
College professors and administrators	43
Extension poultry specialists, agents	22
Teachers	8
USDA	8
Other government agencies	19
Hatchery owners and managers	15
Industry	15
Organizations	3
Business and sales	26
Farmers and farm managers	16
Veterinarians	5

National poultry judging contest

The national intercollegiate poultry judging contest began in 1920 as the Midwest Intercollegiate Poultry Judging Contest. Three colleges participated: Iowa State College, MU and Purdue University. Missouri ranked ahead of all three teams. Chicago had been selected as the place to hold the contest because, at that time, the Chicago Coliseum Poultry Show was one of the greatest fancy poultry shows in the United States.

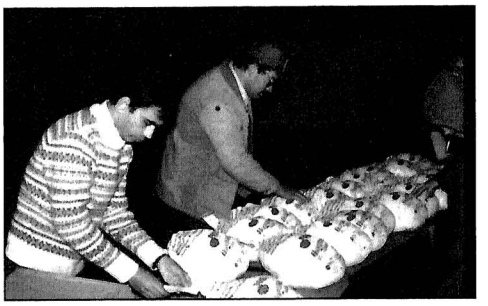
National poultry judging teams 1920 until 1985

Year	Members
1920	M. G. Bonham, E. W. Henderson, H. L. Kempster (coach) and M. A. Seaton
1921	E. W. Henderson (coach), Joe Brand, John Baldwin and Joe Chambers
1922	Rodo Scott, E. W. Henderson (coach), W. G. King, Otis Dale and Paul Quick
1923	Frank Wright, R. M. Smith, E. W. Henderson (coach), H. L. Allen and C. G. Gates Fox
1924	E. W. Henderson (coach), J. H. Farmer (alternate), W. W. Stark, L. G. Neel and H.E. Barnes (alternate)
1925	H. E. Files, E. W. Henderson (coach), G. E. Annin, R. H. Knoop and L. B Swaney
1926	Carl Pittenger, Darrell Young, E. W. Henderson (coach), Gentry Bryan and Estil Schnetzler
1927	H. C. McDougle, E. M. Funk (coach), D. H. Lo, T. V. Davis, R. Sneed and E. R. Halbrook
1928	W. C. Bute, E. W. Henderson (coach), J. R. Nelson, C. E. Rhode and A. L. Farmer
1929	Ed Miller, L. T. Lewis, E. W. Henderson (coach) and Ruby V. St. Clair
1930	E. M. Funk (coach), Glen Woodruff, George Willis, Herbert Fick and Frank Knight
1931	E. M. Funk (coach), Oral Barrow, William Price, Wallace Neel and Q. B. Kinder
1932	E. M. Funk (coach), Paul Wade, Harry Miner, Ray Hargrave, Dick Irwin and Raymond Scoville
1933	E. M. Funk (coach), Alva Meyers, James Forward, Harold Terrill and Charles Williams
1934	Jewett Fulkerson, Alva Meyers, E. M. Funk (coach), William Moore, Samuel Lewis and Harold Terrill
1935	Fred Brune, E. M. Funk (coach), Warren Westbrook, Fred Stonner and Baker Attebury
1936	E. M. Funk (coach), Vincent Hunt, Donald Tucker, Allan Purdy and Harold Wright
1937	Lester Williams, George Newell, E. M. Funk (coach), Charles Talbot, Paul Hagans and Dale Knight
1938	E. M. Funk (coach), Watts Newell, Billy Kerr, James Halsey, James Hamilton and —Johnson
1939	Verl Parker, E. M. Funk (coach), Clarence Lemar, Leo Kennedy, Russell Hellensmith and Floyd Haden
1939	**7th World's Poultry Congress Team**: Jesse Parker, E. M. Funk (coach), Lester Williams, Billy Kerr and James Hamilton
1940	E. M. Funk (coach), Harold Biellier, Richard Irwin (coach), Clyde Bachtel, Hartford Patrick, Raymond Davenport and Clarence Lemar
1941	**National Champions**: P. Tinsley, Harold Biellier, C. Meinert, N. Hall, R. Irwin and E. M. Funk (coach)
1946	**National Champions**: E. M. Funk (coach), Ernest LeGrande, Arthur Shaw, James McGinnis and Robert Wilcox
1947	Q. B. Kinder (coach), Wayne Patterson, Harry Major, Ben Smith and Eugene Burns (alternate)
1948	Q. B. Kinder (coach), Vernon Snider, Bill Frakes, Joe Milligan (alternate) and Jack Hill
1949	Frank Murray, Q. B. Kinder (coach), Michael J. Goosk, H. Edward Gordon and Charles M. Estes
1950	Walter L. Offner, Q. B. Kinder (coach), Harold M. King, Billy P. Teaff and Wendell E. Sederwall
1951	Glen Froning, Raymond Gray, James Morrow, Jack Greer and Q. B. Kinder (coach)
1952	Elmore Putney Jr., Marlin Adkins, William Maxwell, Maynard Yoes and Q. B. Kinder (coach)
1953	Q. B. Kinder (coach), Harold Hall, Dale Ross and Webster Bay
1954	Mike Kelly, Q. B. Kinder (coach), Bill Young, Karl Stout and Ronald Myers
1955	Ora Messick, Q. B. Kinder (coach), Gary McCord and Orville Ostmann
1956	**National Champions**: Thomas Schuchat, Q. B. Kinder (coach), Robert Hastings and George Jury
1957	Loren Nichols, Wayne Seney, Clifford Shull (alternate), Q. B. Kinder (coach) and Ronald Paschang
1958	Lloyd Elliston, Q. B. Kinder (coach), Clifford Shull, R. E. Ray (alternate) and Thomas Barrow
1959	Q. B. Kinder (coach), John Harper, Ronald Stout and William L. Cloud
1960	Ronald Golden, Robert Munson, Q. B. Kinder (coach) and Denzil Hughes
1961	Maynard Yoes (coach), Don Levi, James Runner, Sam Rosenbaum and Stephen Bobbitt
1962	Stanley Steinhoff, David Andrews (coach), Warren Jaynes and Earl Webb

National poultry judging teams 1920 until 1985

Year	Members
1963	Larry Rost, Forrest Lanning, John Fidler, William Lamb and Q.B. Kinder (coach)
1964	Brian Lanning (alternate), Roger Brune, Norman Gephardt, Gary Hargus, Harold Kohne (alternate) and Q.B. Kinder (coach)
1968	Robert Phillips, Don Baldridge, Richard Gregory, Gregory Amantu and Q.B. Kinder (coach)
1969	Donald Carman, Mark Koenigsfeld, Donald Reeder, Anthony Perryman and Q.B. Kinder (coach)
1970	Q.B. Kinder (coach), Ghazi Quadoumi, Bill Martin and Dennis Epperly
1975	Archie Northcutt, Howard Brownfield, John David, Russell Barnes and Glenn Geiger (coach)
1981	Renee Riffle, Brian A. Mull, Randy Gentges, Thomas Fix and Glenn Geiger (coach)
1982	Russell E. Perry, Stanley D. Coday, Grace M. Abuo, Mohamud M. Gure and Glenn Geiger (coach)
1984	Chris Boeckmann, Mary Rose Mgema, Abdullah Issa, Dennis Taylor and Glenn Geiger (coach)
1985	Julie Brandt, Laura Koenigsfeld, Elaine Koenigsfeld and Glenn Geiger (coach)

The 1985 judging team competed in the southern regional contest at the University of Tennessee. Team members were Glenn Geiger (coach), Laura Koenigsfeld, Julie Brandt and Elaine Koenigsfeld.



Poultry Science club members Aminul Haque and Bruce Brutsman arrange freshly dressed turkeys for the Poultry Science Club's annual turkey sale at Thanksgiving. Proceeds from the sale supported annual trips to a poultry convention in Atlanta.

The department's 1920 poultry judging team was: (left to right) M.G. Bonham, E.W. Henderson, H.L. Kempster (coach) and M.A. Seaton. The team placed first.

Poultry Science Club

The MU Poultry Science Club was very active. Members sponsored several community projects. The club held Easter egg decorating contests that accepted submissions from elementary and high school students.

The club participated in the homecoming parades and built trophy-winning floats. The club's moneymaking project was the sale of freshly dressed turkeys at Thanksgiving. The earnings were used to support annual trips to the Southeastern Poultry Convention in Atlanta and were also used to endow a scholarship, which was awarded annually to the most active club members.

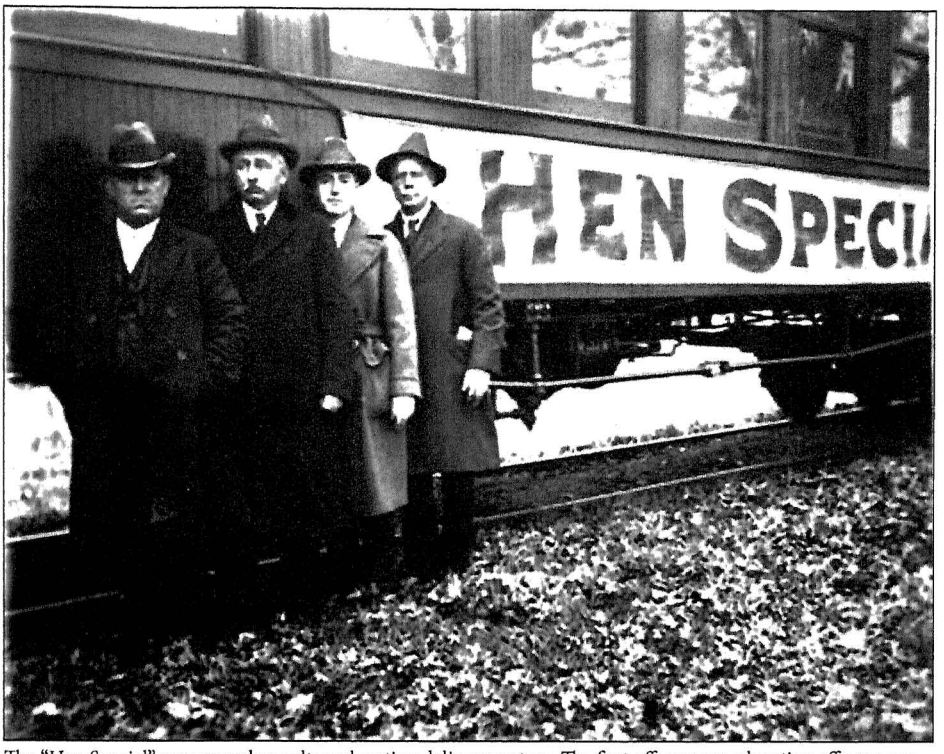
Extension

Before April 1917, extension work was limited to occasional meetings, which were called Farmers' Institutes, convened by the Missouri Department of Agriculture. When a poultry expert was required, the poultry department chairman was enlisted. With the establishment of the University extension service, the Farmers' Institutes were turned over to the college.

An early off-campus educational effort was lectures given by faculty in railroad stations or town squares throughout the state. Sometimes faculty would judge local poultry shows. If 50 or more farmers paid one dollar each toward expenses, the faculty would stop to lecture in that community. These lectures were very popular and attracted large crowds. During World War I, efforts were made to support the government's slogan, "Food Will Win The War." All rural areas were encouraged to increase food production and eliminate waste. Extension's efforts got counties organized to reach these goals and encourage employment of county home demonstration agents.

Townsley was hired as the first poultry extension specialist in 1917 and served until 1923. He was said to be a fine organizer and a prolific writer, and he laid the groundwork for a sound poultry extension program in Missouri. Realizing the need for better breeding flocks, he created a certified breeding program that eventually was adopted as the first part of the USDA's National Poultry Improvement Plan, which greatly benefited poultry breeders, hatchery owners and producers. Ralph Mason, Hubert Cosby and W.R.L. Perry worked with Townsley between 1917 and 1920.

Many subsequent poultry extension specialists were graduates of MU and went on to become outstanding educators or serve in important positions in state and federal government and in the poultry industry and its organizations.



The "Hen Special" was an early poultry education delivery system. The first off-campus education efforts were lectures given by University faculty in railroad stations.

Those following Townsley as state extension poultry specialists were George W. Hervey, 1920-1921; H.L. Shrader, 1921-1926; Berley Winton, 1923-1935; Harold Canfield, 1925-1932; Charles E. Rohde, 1936-1944; D.D. Moyer, 1936-1940; Elmer Winner, 1944-1953; Norman Clizer, 1946-1948; Ted Joule, 1949-1951; Schell Bodenhamer, 1951-1955; Walter Russell, 1953-1978; Leonard Voss, 1955-1957; and Glenn Geiger, 1957-1986. Those who served as area poultry specialists included Warren Jaynes and Wendell Roberts.

Following the merger of the poultry department into the animal science department, Lyons has served as extension poultry specialist and provides computer support for the department.

Poultry extension throughout its history addressed the problems faced at that specific time by Missouri poultry producers and the poultry industry.

From the beginning, diseases, parasites and predators plagued most farm flocks. Coccidiosis, S. pullorum, tuberculosis, cholera, lice, mites, fowl pox, hawks, foxes, raccoons, rats and other pests seemed to be daily adversaries.

Faulty management, poor housing and nutrition and lack of sanitation practices were related, at least in part, to economic loss and failure of farm poultry flocks.

One way to show farmers the importance of recommended practices was to establish extension demonstration flocks and a poultry record-keeping program. County extension agents working with extension specialists played an important role in establishing the demonstration flocks and maintaining the record programs. Extension economists analyzed and summarized the records, which proved invaluable for identifying problem areas and successes.

Extension participated in the statewide effort to improve management and increase production after World War I and World War II. Following World War II, a drop-off occurred in the armed forces' demand for dried eggs. Missouri had been the leading producer of dried eggs but began producing for the new graded egg markets that would provide good quality eggs for the public. Extension efforts stressed frequent egg gathering, refrigerated coolers and other cooling

methods on the farm and the rapid movement of eggs from the farm to the consumer.

Poultry extension publications played an important role in the dissemination of information to the poultry industry, which included producers of turkeys, broilers and eggs.

As time progressed and Missouri farmers began to produce many more eggs than Missourians could use, marketing excess eggs became an important profit issue. Producing clean, high-quality eggs; maintaining wholesomeness; and marketing young roosters and old hens played a role in improving farm poultry income. As new markets developed, interest in larger flocks also developed, and new problems surfaced.

Extension poultry specialists shifted gears to work with the growing number of so-called commercial producers, yet they also continued to work with the family-sized flock owners they always had.

In 1948 there were 260 chicken hatcheries participating in the Missouri Poultry Improvement Association. At that time most chicks hatched were of standard breeds and varieties. Just a few breed crosses were offered, and they were mainly offered for meat production purposes.

In 1963 there were only 81 association hatcheries still in business - a dramatic sign that things were changing. The small-farm flock was disappearing. One large flock of between 1,000 and 10,000 birds replaced 20 to 30 small flocks. Also notable was the reduction of the number of standard breed chickens being sold and the appearance and popularity of inbred/hybrid lines for egg production. Eighteen hatcheries offered hybrids, and almost all hatched breed or strain crosses.

It was during this period that poultry extension specialists were faced with the task of becoming specialized. In 1958 one specialist worked with egg production management and youth programs and a second with broiler and meat production interests.

Hatcheries were also becoming specialized. Eighteen hatched predominantly broiler chicks, and 33 hatched mostly egg production birds. Thirty hatcheries still tried to serve both egg and broiler producers.

Turkey hatchery numbers remained the same between 1958 and 1963. Most turkeys were still raised on range, but new ideas were surfacing.

In 1948 most of the turkeys raised were Broad-Breasted Bronze lines, but 12 of the 25 turkey hatcheries in Missouri offered some type of white feathered bird. Twelve hatched only bronze poults.

By 1963, 15 of 25 hatcheries were hatching white feathered birds and 10 hatched only bronze.

Processors increased pressure on hatcheries to shift to white birds, since white feathers did not cause dark pigments on the dressed carcass.

Hatcheries were exploring confinement growing of turkeys. If the broiler chicken producers could do it, certainly the turkey growers could.

Along with these changes, producers were confronted with the new concept of production contracts. They heard about horizontal and vertical integration. They became owners of large poultry houses and managers of company-owned birds, and they entered legal agreements and lost their traditional independence.

Chicken egg production methods were also changing. Methods changed from litter floors to slatted floors to confinement in cages. Egg producers also faced contract production. In order to successfully confine large numbers of birds in buildings and still have an economically produced, quality product, producers had to learn a tremendous amount of new knowledge about the bird, the environment, nutrition, disease, parasites, temperatures, ventilation, handling, waste product disposal, equipment and much more.

Poultry extension specialists played a vital role in disseminating information on current research and identifying successful methods during these challenging times. Specialists used radio, early live television, newspaper, magazines, statewide and county poultry days, conventions, conferences, tours, on-farm consultations and newsletters to spread information.

As the poultry industry revolution proceeded, the publication of bulletins, circulars and guide sheets by extension specialists became an important part of a successful shift from small-farm rearing practices to large commercial operations.

A review of the topics discussed in the extension newsletter, "Poultry News and Views," reveals the remarkable changes that took place from the late 1950s through 1985.

The same parasites, diseases and vices of the small farm became major obstacles to confining large numbers of birds in a small space, but the problems had less impact because there were other farm enterprises to support the family.

It was a new ball game with rules that were not yet defined. Vaccinations and new management techniques were important. Equipment, automation, housing, ventilation and sanitation all became key issues.

From small flocks, poultry manure was a welcome byproduct for the family garden and pasture, but manure from a10,000- to 20,000-bird flock was a problem. Another problem was the disposal of dead birds.

Since confined birds are wholly dependent upon the caretaker for their food, water and general well being, many questions about feed were raised. What was the best feed formulation for economic production? What was the best feeding method and program? Do confined birds eat more than they need? Will restricted feed programs be practical? All of these questions continued remained unanswered as the commercial industry struggled to grow.

As a result of confining large flocks of birds, some so-called new diseases appeared, such as fatty liver and Marek's diseases. Hysteria was a frightening be-

havioral disease quite evident in some inbred lines.

As problems multiplied with larger flocks, neighbors and government agencies entered the scene. Pollution of the air and water became headline news in some areas. Odors, flies and rodents complicated the situation, as did dust, noise and feathers. Farm location became an issue. Commercial operations near towns, highways, neighbors or recreational facilities meant trouble.

The public image of the poultry industry was tarnished by complaints that made national news. Those concerned with humane animal treatment questioned new problem-solving techniques, such as debeaking as a way to eliminate losses from cannibalism. These groups felt similarly about confinement rearing of broilers, turkeys and laying hens. Keeping hens in cages provoked loud protests.

There were also conflicts between the poultry growers and the integrated contractors. Both parties needed help to clearly state and understand what was needed in the agreements.

New challenges arose daily. In the early 1960s amid concern about building atomic fall-out shelters, producers wondered how to protect birds and livestock. In 1964 pesticide residues found in poultry meat and eggs needed immediate attention. Also in the mid-1960s artificial insemination techniques were developing, especially for the turkey industry.

A variety of problems contributed to the complex picture, such as controlling poultry house temperature, using artificial lighting systems and raising pullets away from adult birds.

Poultry extension specialists addressed these and many other subjects. They consistently provided information to hundreds of letter writers and office visitors and answered requests for assistance made by allied industries and governmental agencies. Specialists took their outreach assignment seriously. Today's successful commercial industry is the result, to a significant degree, of the efforts of these many specialists that served so well.

Research

Research on poultry was limited before the establishment of the department; however, in 1896 the experiment station plan stated that experiment no. 29, which involved caponizing chickens and turkeys, was to be conducted. During the early years of the department, research was practical in nature. The addition of trained personnel and sophisticated facilities allowed the department to include more fundamental research. Projects were broadened to include the departments of agricultural chemistry, agricultural economics, animal husbandry, dairy husbandry, biology, home economics, veterinary bacteriology and zoology.

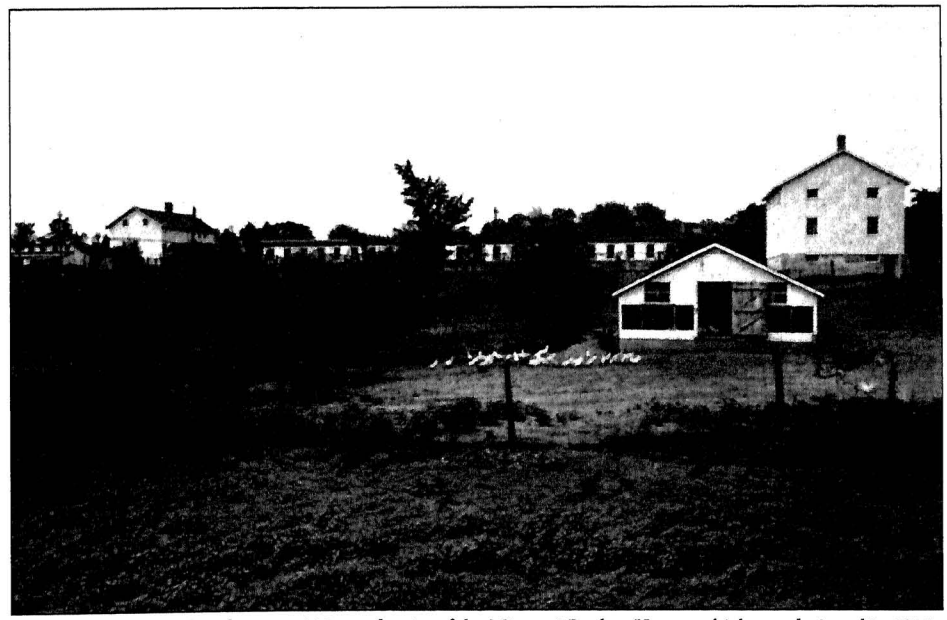
Research from 1911 to 1938

Kempster reviewed research efforts by the department that took place between 1911 and 1938 for a May 1938 anniversary bulletin. The following is his review.

"The poultry department was organized in 1911. Its early activities consisted largely in the establishment of flocks and laying a foundation for research which was to follow.

"In 1915 was designed the square, straw loft, open front "Missouri Poultry House." This type of building is now standard equipment on thousands of Missouri farms. Similar efficiency of design led to the general acceptance of the Missouri Colony Brooder House. Even after 23 years the Missouri poultry house serves as a standard type and its features are being incorporated into poultry houses both of new construction and those being remodeled.

"In 1917 and continuing to date, research with reference to the use of protein concentrates in rations for egg production has occupied an important place in the research program. Early results pointed out that the adequate use of protein supplements would double the egg production over similar rations not containing these supplements. Later results demonstrated the possibility of utilizing soybean oil meal in poultry rations provided suitable combinations with minerals were made. Research with baby chick rations involving the use of milk producers clearly demonstrated the importance of the use of milk in rations for growing chicks. This research led to the formulation of feeding formulae which have served as a guide for those mixing feed either for sale or for home use.



The Porter Street Poultry farm in 1926 was the site of the Missouri Poultry House, which was designed in 1915. The house, shown in the foreground, became standard equipment on thousands of Missouri farms.

"In 1919 research was centered around the utilization of carotinoid pigments by the fowl. The discovery that the principal yellow pigment utilized by the fowl was xanthophylls made possible an understanding of the problem of the control of yolk color in the production of market eggs by limiting the amount of xanthophylls in the ration. It also explained the bleaching of poultry when crate fed for market. These investigations incidentally led to the present theory as to why the shanks of yellow skinned hens fade after continued laying.

"In 1926 studies were made on the correlation between sexual maturity and egg production in which it was pointed out that rate of maturity was an excellent guide to use in the selection of pullets for the laying flock and of birds to be used for breeders.

"Research on the relation of the date of maturity to egg production led to radical changes in recommendations relative to the summer management of pullets. As a result, poultrymen are maturing their pullets at a much earlier date and realizing greater profits because of more liberal fall and early winter egg production.

"Since 1930 problems relative to marketing poultry products have received considerable attention. As a result of research in 1932 it was discovered that dried milk products were equally as efficient as liquid buttermilk or condensed buttermilk in securing gains in milk feeding for market.

"A study was made of the consumer preferences for egg yolk color and shell color in New York City which showed that price discrimination against eggs which did not have pale yolks or which were brown shelled were not justified. It is believed that this study resulted in descriptive standards more favorable to the mid-west egg.

"Work showing the rate at which eggs cool under various environmental conditions attracted national attention and has led to the design of equipment which has caused a considerable reduction in the losses experienced in market eggs due to improper cooling.

"Losses from soiled eggs amount to millions of dollars annually. This problem has resulted in an investigation on the factors influencing the production of clean eggs. Under average farm conditions 25 percent of the eggs are dirty or slightly dirty.

"Even under favorable production practices dirty eggs constitute over seven percent of all eggs produced. Price differentials seriously penalize these eggs and the general opinion is that dirty eggs should not be offered the consumer. Until work at the Missouri Agricultural Experiment Station showed that eggs washed in a one percent solution of sodium hydroxide held up in cold storage as well as did naturally clean eggs of similar quality the washing of eggs was looked upon with disfavor. With this discovery it is believed that the washing of eggs in a proper cleaning solution will become an established practice of those employed in the merchandising of eggs.

"Another phase of research which is receiving considerable attention is a study of the normal growth of chickens under normal conditions. The results of this research will be found in three publications. The first is entitled "The Influence of Temperature on the Growth Rate of the Embryo."

"The second deals with some production costs with growing chicks which serves as a guide as to feed consumption, fuel and labor requirements and the growth that may be expected. The third publication on growth of chickens reveals the fact that chickens hatched early grow much faster when young than do those hatched late. However, retarded growth when young is compensated for by accelerated growth later. This measure has been made possible because of standards of growth that have been established. Eventually chicks hatched at later dates attain the same weight, as do those hatched early. From these studies it is concluded that one of the important reasons for fluctuations in the growth curve is the high temperatures during the summer months. The years 1934 to 1936 furnished evidence to support this theory. It was also discovered that chicks of smaller size are influenced less by periods of extreme heat.

"Other investigations of economic and practical importance are the feed purchasing power of eggs, made in 1924 and 1933, factors influencing hatchability (1934) and egg weight in the domestic fowl (1934)."

Faculty research

Funk studied a variety of factors associated with production and keeping quality of eggs.

More than 99 percent of all eggs were clean before they came in contact with the nest, so improving nest cleanliness and decreasing the amount of time an egg spent in the nest resulted in the cleanest eggs. Washing dirty eggs in warm water or a 1 percent sodium hydroxide solution improved hatchability.

Eggs treated with heat kept their commercial grade longer than untreated eggs. Heat applied to penetrate the entire egg stabilized shell egg quality, immediately and permanently arrested embryonic development in fertile eggs and greatly retarded normal breakdown of thick albumen. The heating process minimized yolk blemishes and stuck yolk. Cooking tests showed that treated eggs were definitely superior to untreated eggs. The conclusion of this research was that this process might be of value in preventing loss of quality and spoilage in eggs.

From this research, Funk gained a patent on heat-stabilized eggs. The U.S. government used this process extensively to reduce spoilage in eggs that were shipped overseas for military personnel.

Funk's early nutrition research focused on meal substitutes. He demonstrated that, when corn gluten meal was substituted for soybean oil meal, growth was reduced. When ground barley was substituted for yellow corn meal, growth was slowed and mortality increased because of barley hull im-

paction of the intestines. High-protein turkey mashes used in a diet containing 27 percent to 40 percent protein resulted in a waste of protein.

Funk and Forward's three-year study summarized in 1951 showed that high humidity is more important during incubation than it is before incubation. Turning eggs through 90, 120 and 150 F increased the percentage hatched compared to turning eggs through 60 F.

O. J. Kahlenberg studied the effect of cooking methods on chicken palatability and tenderness. Dark meat was more flavorful, tender and juicier than the white meat from the same chicken. Pressure-cooked meat was significantly more tender than boiled or simmered meat.

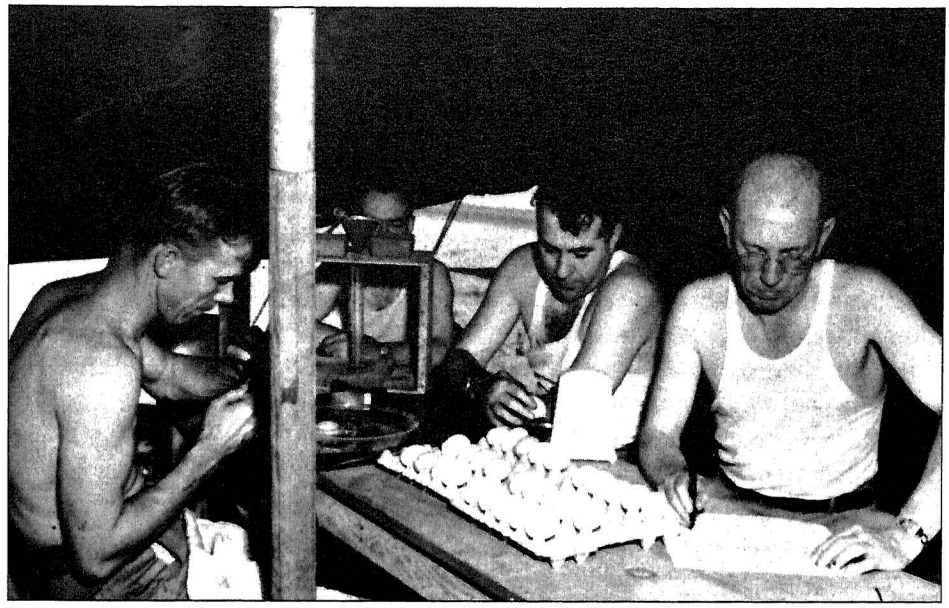
Irwin reported, in 1947, superior Barred Plymouth Rock chicken growth when chicken scrap replaced meat scrap.

Kinder studied chick growth diets containing crystalline riboflavin. Riboflavin made it possible to use a simplified corn and soybean oil meal formulation for chicks, so chick starter rations were reduced by $10 to $15 per ton. Initial studies used a protein concentrate combined with homegrown grains.

Kinder's studies on laying shelters demonstrated that floor space could be reduced from three to 1.5 square feet for yearling hens with little reduction in production or feed efficiency.

Savage studied the value of supplemental amino acids and zinc on broiler strain chicks that were fed purified and practical diets. His studies helped establish the amino acid, energy and zinc requirements of broiler chicks at various ages and on a variety of diets. This research was duplicated with turkey poults. The possible chelating effect of phytic acid on the zinc requirement was established.

Savage's research using purified diets established zinc and copper requirements. Based on egg production and hatchability data, the copper requirement of the laying hen was established at above 2 ppm and was possibly as high as 8 ppm.



Dr. George Stewart of Iowa State College, Sgt. Marlow Olson, Maj. James M. Gwin and Funk are testing thermostabilized eggs at Needles, California.

Other studies of Savages targeted nutrient levels and ratios to determine their effect on fatty liver hemorrhagic syndrome in laying quail and hens, the effects of antibiotics on egg production, riboflavin in chick diets and artificial light on game-bird egg production.

Cotterill studied the liquid components of an egg. Centrifugation, heat treatment and pancreatic lipase all improved foaming properties of yolk-contaminated egg white. When egg white was sprayed at pH 8.5 the conalbumin and lysozyme fractions were more stable and more functionally active.

Another study of Cotterill's focused on salmonella. Whole egg and yolk products inoculated with *Salmonella oranienberg* were heated for 3.5 to four minutes at a temperature above 66 C. Adjusting liquid egg white to pH 9 and holding at 46 C for 24 hours produced salmonella negative samples. At lower temperatures most of the inoculated cells survived.

Biellier determined the thyroxin secretion rate of growing White Pekin ducks, crossbred chicks and turkey poults up to 10 weeks of age. The thyroid activity of White Leghorn and White Plymouth Rock hens as affected by age, season and level of egg production was studied. He demonstrated that using grain sorghums harvested on-range to feed growing turkeys reduced the feed cost of producing market turkeys. A high-protein mash and whole-grain milo was used successfully to feed turkey poults after three weeks of age.

Biellier found semen from male turkeys with yellow color or chronic infertility to contain large numbers of macrophages. Tissue culture of testes containing abnormal spermatids demonstrated a cytopathogenic effect typical of that produced by the herpes virus.

Biellier developed an inbreeding technique to increase fertility, decrease embryonic mortality and increase hatchability of turkey eggs. Embryonic mortality during the first week of incubation was lowered from 11.4 percent to 5.1 percent and hatchability of fertile eggs increased from 68.3 percent to 88.8 percent for sibling matings after 10 generations of selection. Embryonic mortality was decreased to less than 1 percent on all but the last two days of incubation. Individual breeders that hatched 100 percent of total eggs for an entire reproductive cycle were recorded.

Biellier's studies of the effect of photoperiodicity on laying hens showed that the total amount of light and darkness had a direct effect upon the time

of oviposition. Light-dark cycles of less than 24 hours were used to select and develop 900 pedigreed hens, and over 600 were able to produce an egg in less than 24 hours during an extended laying period. The highest record of any hen was 371 eggs per year, and that hen continued to lay for a total of 448 eggs in 448 days. Shown to be an additional factor on hen oviposition time is the pineal hormone, melatonin.

Stephenson collaborated with Gordon Dickerson of the U.S. Department of Agriculture to conduct a northcentral regional experiment to produce chickens with hybrid egg types. The objective of this experiment was to use a noninbred female population to reduce the cost of producing hybrid laying hens.

This project, called recurrent selection, consisted of an inbred population from which males were used to sire the hybrid progeny and the next generation of the inbred line, which mated at random. The females to produce the hybrid progeny were from a non-inbred population of highly desirable production traits.

In another of Stephenson's studies, turkey eggs taken from Ohio's large population of randomly bred turkeys produced high and low hatchability lines. After three generations of selection the high and low groups differed by 7 percent to 14 percent in hatchability. This difference did not increase over the next three generations and had wide annual differences. Hatchability is possibly controlled by nonadditive genetic factors.

Hatching production in cage and floor environments were tabulated for both large and medium sized populations of turkeys. The caged birds laid more eggs, but their hatchability was lower. Housing differences did not affect number of poults. The medium sized birds in cages produced significantly more compressed, sided eggs than the other three groups the first year, but the following year the medium sized birds in cages had a large reduction in the frequency of compressed, sided eggs.

Vandepopuliere evaluated industrial and agricultural byproducts. He developed and tested byproduct processing methods and equipment that would minimize production cost and maximize product safety and feed value.

A new ingredient was made out of the residues of a broken egg after the yolk and albumen were removed. The ingredient was produced using a modified triple-pass Heil dehydrator. Officials of the Association of American Feed Controls named this product eggshell meal. Eggshell meal, which had an ingredient value of $39 per ton, could be incorporated into diets as a source of protein and calcium.

Two byproducts of broiler and replacement pullet hatcheries, on-farm dead and spent hens, produced two types of meals with economic values of $111 and $154 per ton, respectively. On-farm dead composting and spent-hen processing systems were developed and used widely in commercial production.

The egg industry was concerned with Salmonella enteriditis contaminated eggs. Vandepopuliere and Cotterill collaborated to develop a procedure, which was patented in 1999 and licensed, to produce and market pasteurized shell eggs. This process produces eggs that can be used safely in recipes that call for raw eggs.

Poultry organizations

Over the years the poultry department faculty and extension specialists were intimately involved with the Missouri poultry organizations. In many cases, the department was the prime organizer of interested leaders into groups that could appropriately address their particular objectives and needs.

It was through cooperation with poultry farmers, industry and organizations that much of extension's work was accomplished. Many organizations depended heavily on the University for leadership and direction and used MU as home base.

Some of these organizations that played an important role were the Missouri Poultry Council, the Missouri Poultry Improvement Association, the Missouri Egg Council and the Missouri Broiler Council.

The Missouri Poultry Council was formed in 1945 and led by Leonard Voss, who later became a poultry extension specialist. Its long-time efforts led to the passage of the Missouri Egg Law, which required eggs to be sold by grade and size.

The Missouri Poultry Improvement Association was Missouri's arm of the National Poultry Improvement Plan, which developed and succeeded under the leadership of Funk. It was designed to improve poultry breeding and control and eliminate diseases that were passed around the hatcheries from egg to chick. Extension specialists wrote and edited many of their educational bulletins.

The Missouri Egg Council was organized in 1959 by and for egg producers who promoted egg use and quality production methods. Long-time executive director, Jo Ann Manhart, who was still active in 2006, is affectionately known as "the egg lady." The organization always maintained strong ties with the poultry department.

The Missouri Broiler Council was an organization of broiler growers, hatchery owners and processors. It was created to improve quality and promote broiler chicken use. Their efforts made chicken barbecue popular. The 4-H Chicken of Tomorrow contests challenged members to raise, process and exhibit superior birds at public events.

There have been many other groups organized in Missouri. All have provided, in some way, opportunities for poultry specialists to give educational support that propelled the people of Missouri into a better position to help themselves and compete in the marketplace.

Theses in poultry husbandry 1920-1985

Hervey, G.W., M.S.	1920	The Relative Value of Different Protein Bases for Laying Hens
Henderson, E.W., M.S.	1924	The Effect of Temperature upon the Rate of Growth of the Chick Embryo
Smith, R.M., M.S.	1926	The Influence of Ultraviolet Light, Yellow Corn and Mineral Supplement upon the Production, Hatchability and Quality of the egg
Forward, J.A., M.S.	1935	A Study of Missouri Demonstration Farm Poultry Flocks
Parker, J.E., M.S.	1936	The Normal Growth of Chickens under Normal Conditions
Hamilton, J.C., M.A.	1941	Some Factors Affecting Reproduction in Quail and Chicken Partridges
Irwin, M.R., M.A.	1941	The Value of Soybean Oil Meal in Rations for Young Chicks
Williams, I.L., M.S.	1941	Factors Affecting Temperature Changes in Poultry During Refrigeration
Joule, T.L., M.A.	1947	A Study of Missouri Demonstration Farm Poultry Flocks
Wisdom, J., M.S.	1948	Survey of Missouri Hatching Eggs Sales
Winter, E.B., M.A.	1949	A Study of Poultry Population Changes and Related Factors
Dendy, M.Y., M.S.	1950	The Production of Clean Eggs
Milligan, J., M.S.	1950	Extent Heredity Influences Certain Quality Characteristics of Eggs of the Domestic Fowl
Hill, J.F., M.S.	1950	Genetic and Environmental Influence on Hatchability and the Subsequent Effect on Egg Production and Adult Mortality
Voss, L.A., M.S.	1952	A Study of some Economic Factors of Broiler Production in Missouri
Greer, F.R., M.S.	1954	A Study of Turkey Production in Missouri for 1953
Grotts, R.F., M.S.	1956	Seasonal Variation in Egg Quality
Chaney, P.H., M.S.	1956	Factors Affecting Interior Egg Quality
Kelly, M., M.A.	1956	Unidentified Factors; Hatchability and Chick Growth
Yoes, M., M.S.	1957	The Effect of Method of Rearing on the Productive Performance of Chickens
Froning, G.W., M.S.	1957	Effect of Season and Age of Layer on Egg Quality
Hurley, W.C., M.S.	1957	Factors Affecting the Flavor of Fowl and Broilers
Ostmann, O., M.S.	1959	The Effect of Varying Day Length on the Time of Oviposition in the Domestic Fowl
O'Neal, R.M., M.S.	1959	Effect of Antibiotics on Laying Hens
Cunningham, F.E., M.S.	1959	Effect of Season and Age on Egg Compositon
Colburn, J.T., M.S.	1960	A Modified Test for Microquantities of Lipids
Day, T.W., M.S.	1960	Protein Level and Egg Production
Gardner, F.A., Ph.D.	1960	Chemical Modification of Egg White Function
Ross, D., M.S.	1960	Nutritional Supplements that Stimulate the Growth Rate of Chicks
Nickols, E.L., M.S.	1961	The Effect of Restricted Feeding on the Growth and Subsequent Performance of Laying Hens
Seideman, W., M.S.	1962	Factors Affecting Heat Coagulation of Egg White
Yohe, J.M., M.S.	1962	Factors Affecting Zinc Availability for the Chick
Bird, D.W., M.S.	1963	Copper Deficiency in Laying Hens
Cunningham, F.E., Ph.D.	1963	Insolubilization of Egg White Proteins
Jackson, D., M.S.	1963	The Practicality of Foraging Grain Sorghum by Market Turkeys
Rosales, A., Ph.D.	1963	The Relation of Interval between Ovipositions and Hatchability
Sebring, M., M.S.	1963	Factors Affecting Sensitivity of Whole Eggs
Harrison, P.H., M.S.	1964	Photoperiod and Production in the Fowl
Hill, W.C., M.S.	1964	Spray-Drying Egg White at Various pH Levels
Jaynes, W., M.S.	1964	Foraging Grain Sorghums by Broad-breasted Bronze Turkeys

Theses in poultry husbandry 1920-1985

Schulze, J.H., M.S.	1964	Protein and Methionine Levels for Broilers
Gardner, J.R., M.S.	1965	Unidentified Nutritional Factors and Avian Reproduction
Norris, M., M.S.	1965	Composition and Functionality of Fractionated Whole Egg
Radmall, G.D., M.S.	1965	Dietary Cation-Anion and Levels and Chick Growth
Andrews, D.A., Ph.D.	1966	Recurrent Selection and Genetic Parameters of Economic Importance in the Domestic Fowl
Bentley, A.B., M.S.	1966	Effect of Nitrate on Laying Hens
Bird, D.W., Ph.D.	1966	Copper Deficiency and its Effect upon Reproduction, Growth and Connective Tissue Synthesis in Avian Species
Harrison, P.H., Ph.D.	1966	Variations of Physiological Rate Functions of the Domestic Fowl Subjected to Abrupt Changes in Environmental Temperature
Nichols, M.L., M.S.	1966	Egg Product Pasteurization Efficiency
Seideman, W., Ph.D.	1966	Ion-Exchange Chromotography of Egg Yolk
Yoes, M., Ph.D.	1966	Phenotypic Relations and Estimates of Genetic Parameters from Diallel Matings of Chickens
Prasad, S., Ph.D.	1966	Histological Location and Role of Uterovaginal Glands in Storage and Release of Spermatozoa in Chickens and Turkeys
Hill, W.P., M.S.	1967	The Use of Protein Concentrates to Increase Foraging of Grain Sorghums and Decrease Concentrate Intake with Age by Broad-breasted Bronze Turkey Males.
Hughes, D.M., M.S.	1967	Influence of Unidentified Nutritional Factors on Reproduction of Poultry.
Kohne, H.J., M.S.	1969	The Influence of Grain Sorghum Feeding Methods on Growth Rate of Broad-breasted Bronze Turkey Males from Three to Twenty-five Weeks of Age
Shook, J.G., Ph.D.	1969	Embryonic Abnormalities and Egg Characteristics in Turkeys
Fidler, J.W., M.S.	1970	Dietary Amino Acid Levels and Turkey Growth
Panda, N.C., Ph.D.	1970	Interrelationships in the Metabolism of Arginine, Lysine and Dietary Cations by the Chick
Holleman, K.A., Ph.D.	1971	Some Physiological Factors and Insemination Techniques Affecting Reproductive Efficiency in Turkeys
Kobayashi, K.K., M.S.	1971	Effect of Body Size and Ration on Performance of Caged Layers
Cherry, J.A., Ph.D.	1972	Antithyrotoxic Nutrient Studies
Sangster, R.T., M.S.	1972	Methionine Requirements of Turkey Poults
Kilburn, T.G., M.S.	1973	Lysine Requirement of Turkeys 8-20 Weeks of Age
Kanungo, H.K., M.S.	1974	Effect of Feeding Hatchery Byproduct Meal and Egg Shell Meal on Internal and Physical Characteristics of the Hen's Egg
Jessen, H.C., M.S.	1974	Cytogenetic Analysis of a Phenotypically Abnormal Strain of Domestic Turkey Exhibiting Zero-Egg Production
Ballard, P.D., Ph.D.	1974	The Daily Feed Intake Rhythm of the Domestic Hen as Affected by Lighting Cycles, Reproduction and Appetite for Calcium
Carman, D.W., M.S.	1974	Effect of Different Protein, Methionine and Lysine Levels in Growing Turkey Diets
Quadoumi, G.R., M.S.	1974	Increased Air Pressure Before Incubation and Hatchability of Chicken Eggs
Hess, R.A., M.S.	1975	Cytological Studies of the Epididymis and Ductus Deferens of White and Yellow Semen Turkeys
Bercovits, A.B., Ph.D.	1976	Plasma Pregnane Steroids at Various Stages of the Reproductive cycle in Turkeys
Thurston, R.J., Ph.D.	1976	Physiopathological Studies of Semen Production in the Domestic Turkey
Christensen, V.L., Ph.D.	1978	Physiological Parameters Limiting Hatchability in the Domestic Fowl and Domestic Turkey

Theses in poultry husbandry 1920-1985

Yassin, O.E., Ph.D.	1978	The Photoperiod and Ahemeral Light-Dark Cycle Effect on White Leghorn Layers
Elamin, H.M., Ph.D.	1978	Nutritional Value of Sesame and Grain Sorghum for Broilers
Wills, J.R., Ph.D.	1978	Dietary Carbohydrates and Occurrence of Fatty Livers in Laying Hens
Liou, S., M.S.	1979	The Effect of Photoenvironment on Plasma Ovarian Hormone Levels During the Ovulatory Cycle of Chickens and Turkeys
Schlink, G.T., M.S.	1979	Serological Techniques for Pasteurellosis in Turkeys
Koelkebeck, K.W., M.S.	1980	The Effect of Ahemeral Light-Dark Cycles on White Leghorn Layers
Mateo, C.D., Ph.D.	1980	Influence of Dietary Modification on the Incidence of Fatty Liver Hemmorrhagic Syndrome in Japanese Quail and Laying Hens
Arvat, V., Ph.D.	1980	Evaluation of Cage Layer Wastes as a Feedstuff for Ruminants and a Comparison of Metabolizable Energy and "True Metabolizable Energy"
Lyons, J.J., M.S.	1981	Thiourea as a House Fly Larvicide in Caged Laying Hen Wastes: Topical and Feed Additive Administration
Britton, D.E., M.S.	1981	Deep-fat Frying Inedible Eggs for Use in Animal Feeds
Al-Yousef, Y.M., M.S.	1981	The Evaluation of Production Control Data to Develop Quality Standards in a Cage Layer Operation
Abdelkarim, M.R., M.S.	1982	Effect of Light Intensity and Photoperiod on White Leghorn Layers
Hunt, J.H., M.S.	1982	Preservation and Utilization of Corn Stillage Diets
Sandoval, M., M.S.	1982	Influence of Microbial Fermentation Products and Inorganic Sulfate on the Growth of Chicks
Caldwell, J.M., M.S.	1983	Methane Effluent as a Feedstuff for Layers
Al-Yousef, Y.M., Ph.D.	1985	Dates as Feedstuff for Poultry and the Effect of Alkali on Date Pit Fiber
Collier, S.D., M.S.	1985	The Effect of Linoleic Acid on Growth and Reproductive Performance of Japanese Quail
Liou, S., Ph.D.	1985	Oviposition Entrainment in the Domestic Fowl: The Roles of Light-Dark Cycle, Melatonin and Catecholamines
Hempe, J.M., M.S.	1985	Essentiality of Lithium for Avian Reproduction
Rhoades, J.F., M.S.	1985	Dietary Modifications and Fatty Liver Hemorrhagic Syndrome in Laying Hens and Japanese Quail
Thorne, D.H., M.S.	1985	High Moisture Corn Stillage and Methane Digester Effluent Diets and an Automated High-Moisture Diet Feeding System for Laying Hens
VanHorn, J.D., M.S.	1985	Effect of Photoperiod Length on Chicken Egg Production

Staff

A dedicated staff provided support to faculty members and students.

The first poultry department secretary was Sara Davenport. She began working for Kempster in 1912. The secretary who was with the department longest was Mary Smith, who was secretary from 1967 to 1985. Along with Doris Lyons, who was secretary from 1982 to 1985, Smith continues to serve the University and animal sciences department.

Harriett Rimmer maintained the Missouri Poultry Improvement Association office in the poultry department. She devoted most of her working years to the Missouri poultry industry. In 1932 she processed performance records of poultry breeding for the poultry department. She ultimately became manager and administrator of the association. Rimmer played a role in special events, such as Turkey Day and Egg Day, and in short courses. She managed hospitality for poultry department guests. She organized over 30 conventions for the Missouri poultry industry and kept records on over three million breeder birds tested for Pullorum disease.

Poultry department secretaries from 1967-1985. Bottom row (left to right): Theresa West, Mary Smith and Lesa Weiss. Top row (left to right): Doris Lyons, Tina McLaury, Ruth Martin, Marilyn White and Debbie Coleman.

Poultry department staff who served as superintendents, foremen, technicians and research specialists between 1967 and 1985. Bottom row (left to right): Cynthia Smith, Ralph Poe and Russell Smith. Top row (left to right): Clayton Hawkins, Jesse Lyons, Mike Russell and James Forward.

References

Kempster, H. L. Letters and Biographical Sketches. 1912-1960. University of Missouri Archives.

"Poultry," State Department of Resources and Development, 1947.

Funk, E. M. History of the Department of Poultry Husbandry. SR 85-68, University of Missouri. Agriculture Experiment Station.

Funk, E. M. History of the Department of Poultry Science, 1967- 1985. Special Report 354. College of Agriculture, University of Missouri

Funk, E. M. Ozark Farm Boy to University Professor Emeritus. An Autobiography June, 1975. Revised 1990. College of Agriculture, University of Missouri.

Funk, E. M. Poultry Industry of Missouri. 8878-69. Agriculture Experiment Station, University of Missouri.

Appendixes

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Appendix A

Faculty, professors emeritus, staff and graduate students in September 2005

Animal sciences faculty

Front row: (left to right) George Jesse, Jon Greene, Andrei Alexenko, Bob Weaber, Jeff Firman, Kevin Fritsche, David Patterson, Al Garverick, Eric Berg, Jim Williams and Ron Belyea

Second row: Eric Antoniou, Ed Rucker, Gauri Manandhar, Peter Sutovsky, Marcia C. Shannon, D. Spiers, Mike Smith, Randy Prather, Matt Lucy, Tryge Veum and Jim Spain

Third row: Jeremy Taylor, Robert Schnabel, Monty Kerley and William Lamberson

Professors Emeritus

Front row: (left to right) Milton Bailey, G.B. Thompson, Harold Hedrick, Fred Martz, Don Naumann, George Garner and John Campbell

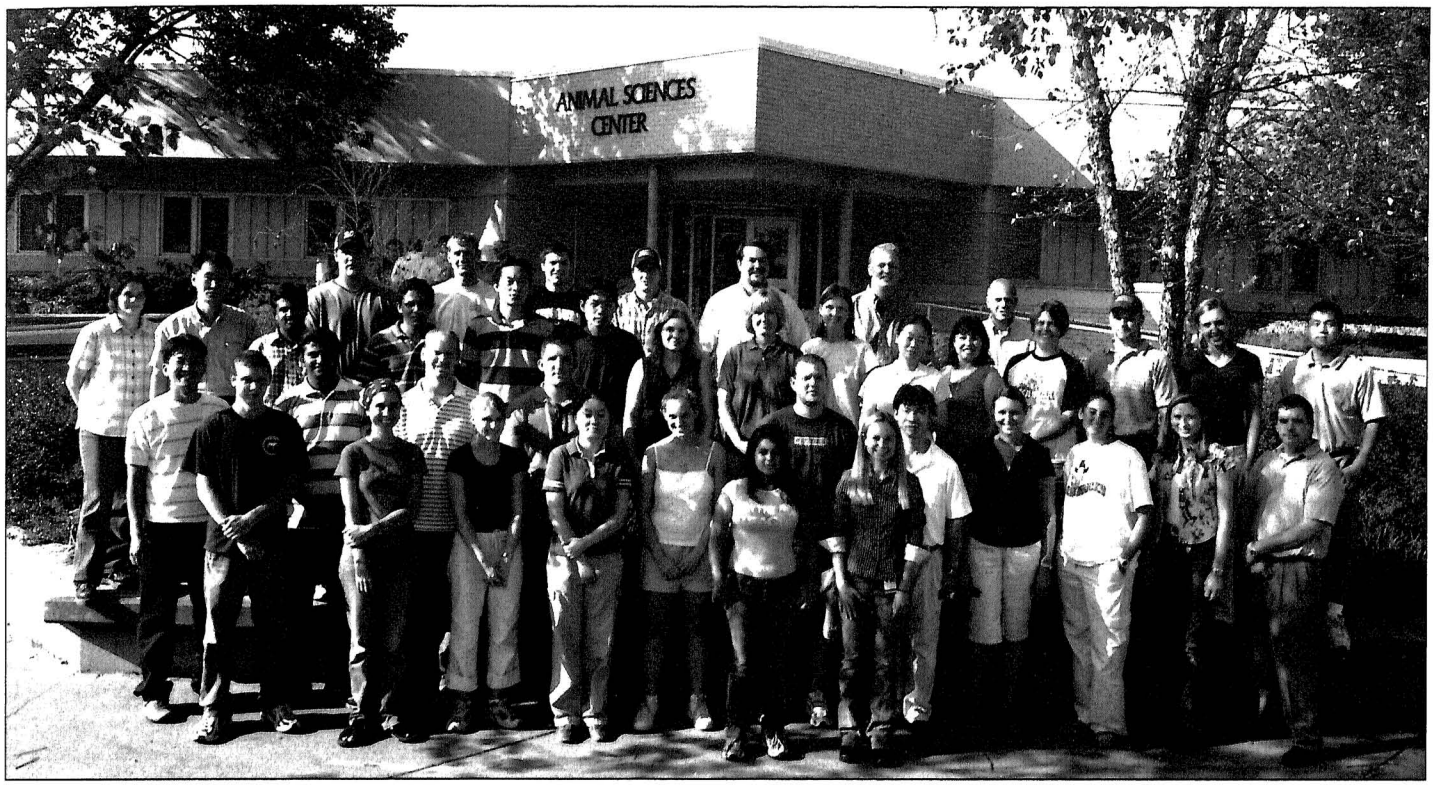
Second row: Steve Zobrisky, Bill Day, Wayne Loch, Glenn Geiger, Joe Vandepopuliere, A.B. Stephenson and Harold Biellier

Animal sciences staff

Front row: (left to right) August Rieke, Jesse Lyons, Doris Lyons, Jim Porter, Peggy Ann Eichen, Mary Smith, Lee Spate, Kristin Whitworth, Jackie England and Jonathan Broomhead

Second row: Jarrod Robertson, David Wax, Laura Wax, Tina Carmack, Judy Burton, Cindy Glascock, Julie Sampson, Emily Fergason, Cyndi Jennings, Gail Kraus and Miriam Sutovsky

Graduate students and post doctoral students



Front row: (left to right) Fabiana Farias and Cia Scott

Second row: Brad Scharf, Jessica Meisinger, Emily Burger, Young-Joo Yi, Jennifer Antelman, Clay Isom, Zhilin Liu, Kristi Cammack, Denise Meyer, Courtney McHughes and Chad Carr

Third row: Jin Geol Kim, Raja Settivari, Daniel Busch, David Newman, Anna Slusarz, Jackie Atkins, Erica Berg, Wei Zhou, Julie Sampson, Regan Vogel, Jay Wilson, Lilian Pulz and Chunjiang Fu

Fourth row: Kelly Moore, Jae Woo Kim, Prakash Bommala, Sachin Bhusari, Ping Yao, Yi Zhuang, Matt Ryan, Ed Creason, Bill Kolath, Luke Miller, Matt McClure, Ian Shann and Joe Meyer

Appendix B

Animal sciences faculty, 1980 to present

Animal sciences faculty 1980 to present

Nutrition

Kevin Fritsche 1988-present Nutritional Immunology

Fritsche's research interests include the influence of dietary fats on immune cell function and infectious disease resistance and studies on the effects of diets rich in n-3 PUFA for domestic animals.

Beef

William Pfander 1952-1988 Ruminant nutrition; directed Missouri Agricultural Experiment Station

Pfander's research area was trace minerals and nitrate metabolism in ruminants.

J. M. Asplund 1969-1992 Beef nutrition

Asplund's research focused on amino acid requirements of sheep; he published "Principles of Protein Nutrition of Ruminants" in 1994.

Larry Wilson 1977-1980 Ruminant nutrition

John Paterson 1979-1993 Ruminant nutrition

Paterson's research focused on factors that reduce fescue toxicosis in ruminants.

James Williams 1980- present Ruminant nutrition

Williams researches byproduct feeds, rumen-protected protein and amino acids, forage level for beef cattle, previous nutrition on compositional growth and metabolism and food processing waste as a feed for beef cattle, sheep and swine.

Monty Kerley 1987-present Ruminant nutrition

Kerley studies parameters that impact fermentation efficiency in the reticulorumen and the impact of diet formulation and postabsorptive metabolism on gain efficiency of beef cattle.

Dairy

Fred Martz 1961-present Dairy nutrition and forage utilization

Martz's research involves pasture-based finishing of beef cattle. Fatty acid profiles of beef from cattle finished on pasture show three to six times more conjugated linoleic acid than feedlot finished cattle. He presents guest class lectures about grazing techniques and sustainable agriculture on request.

Rex Ricketts 1977-present Dairy production, management and nutrition; director of commercial agriculture

Rickett's studied the effect of calcium to phosphorous ratio on growing Holstein steers. He used radioactive calcium and phosphorus to measure growth and bone mineralization

Ronald Belyea 1978-present Ruminant nutrition

Belyea's research efforts focus on composition and quality of byproduct feeds.

James Spain 1990-present Dairy nutrition

Spain's research focus is nutritional and environmental management to reduce stress associated with making the transition from late gestation to early lactation. This research led to the development of the 100 Day Contract management concept. Other research developed strategic cooling and diet formulation to reduce the negative impact of heat stress on lactating dairy cattle.

Microbiology

Eugene Ianotti 1975-1990 Rumen microbiology

Equine

Wayne Loch 1973-present Equine production and management

Loch teaches horse production, an animal sciences problems course on horse training, horse selection and evaluation, and he contributes to parts of animal sciences lab practicum.

Animal sciences faculty 1980 to present

Poultry

James E. Savage 1954-1990 Nutrition

Owen J. Cotterill 1956-1987 Egg technology

Joe M. Vandepopuliere 1972-1997 Nutrition

Jeffre Firman 1987-present Turkey nutrition

Firman's research focuses on cost reduction of poultry diets through the use of ideal relationships of protein and energy as well as novel computer feed formulation methodologies.

David Ledoux 1990-present Mineral nutrition

Ledoux's research program involves three main projects: investigating methods for increasing mineral utilization by poultry, investigating the effects of mycotoxins on performance and health of poultry and evaluating methods used to detoxify contaminated feedstuffs.

Swine

Trygve Veum 1967-present Swine nutrition

Veum's research areas are amino acid and mineral nutrition, novel protein sources for weaning pigs and phytase enzymes and low phytic acid grains used to increase mineral digestibility and reduce excretion in manure.

George Jesse 1977-present Swine production and management

Jesse serves as director of undergraduate studies. He has primary responsibility for coordinating student advising, student assessing, developing curriculum and executing all teaching related administrative duties. Past research focused on feeder pig and reproductive gilt management, individual versus group feeding of the growing/finishing pig, market hog shrink and impact of ambient temperature on swine performance.

Bobby Moser 1981-1987 Swine nutrition

Gary Allee 1987-present Swine nutrition

Allee's current research interests include energy and amino acid sources, genetically modified grains and the influence of nutritional modifications on intestinal health, nutrient excretion and odor.

Meats

Eric Berg 1989-present Meat science and muscle biology

Berg's research focus is evaluation of nutritional and environmental factors that influence meat animal production efficiency, health and carcass composition and quality.

Carol Lorenzen 1999-present Meat science

Environmental Physiology

Harold Johnson 1956-1990 Dairy environmental physiology

Donald Spiers 1991-present Dairy and beef cattle environmental physiology

Physiology

Charles P. Merilan 1948-1993 Dairy physiology; associate director of Missouri Agricultural Experiment Station

Harold V. Biellier 1953-1989 Poultry physiology

Billy Day 1958-2001 Swine reproductive physiology

Day conducted research on the basic mechanisms controlling ovarian activity and on physiological factors required for fertilization, early embryonic survival and pregnancy maintenance. Day also developed improved breeding programs based on fundamental concepts. Day's research also emphasized controlled reproduction programs, including synchronization of estrus and ovulation.

John D. Sikes 1959-1995 Dairy cattle judging; ova and semen processing

Ralph Anderson 1965-1998 Dairy physiology

Animal sciences faculty 1980 to present

Allen Garverick 1971-present Dairy reproductive physiology

Garverick's research focuses on endocrine and molecular mechanisms associated with ovarian follicular growth and development in cattle. Studies have used whole animal and molecular models. He investigates changes in ovarian follicular dynamics, including cyst dynamincs, during the postpartum period and the estrous cycle and their relationship to endocrine and gene changes.

Ted Mollet 1980-1985 Endocrine and lactation physiology

Michael Smith 1980-present Beef cattle reproductive physiology

Smith's research program focuses on mechanisms associated with follicular development that culminate in the release of a fertilizable germ cell and the formation of a corpus luteum. The goal is to better understand extra and intra ovarian mechanisms regulating follicular maturation and corpus luteum function. An additional goal is to develop improved methods of controlling reproductive events.

Duane Keisler 1984-present Sheep and beef reproductive physiology

Keisler's research efforts range from molecular investigations of neuroendocrine mechanisms to applied, on-farm research projects. His main research is in endocrinology/neuroendocrinology,as it relates to animal growth and development, reproduction, stress, appetite regulation and ultimate carcass composition.

Kathy Sharpe-Timms 1990-present Reproductive pathophysiology

Sharpe-Timms' research focus is the study of endometrial anomalies with special emphasis on the etiology and pathophysiologies of the disease endometriosis. Initial research has discovered novel endometriosis associated with gene and protein expression, which may be involved in the pathogenesis of the disease.

Jeffrey A. Carroll 1996-2004 Swine physiology

Carroll is a lead USDA-ARS scientist whose research focuses on improving neonatal swine performance and well-being through the investigation of interactions associated with growth, stress, nutrition and immune regulation.

Genetics

A.B. Stephenson 1953-1983 Poultry breeding and genetics

Dale Vogt 1979-1994 Beef breeding and genetics

William Lamberson 1984-present Swine breeding and genetics

Lamberson's research focuses on the genetics of swine reproduction, conservation of genetic variation in livestock breeds and genetic variation associated with environmental stress. He teaches introductory animal science, general genetics, livestock genetics, applied statistics and mathematical modeling.

Eric Antoniou 1991-present Genes controlling reproductive efficiency

Antoniou's research activities are centered on understanding the genetic regulation of two major physiological processes: growth and development of bovine antral ovarian follicles and long-term acclimation to heat stress and fescue toxicosis.

Christopher Kaiser 1998-2001 Beef breeding and genetics

Jerry Taylor 2002-present Animal genomics

Taylor's research focuses on the identification of genes and mutations within genes that are responsible for variation in milk production, growth, efficiency of growth and carcass composition traits of cattle. Some tools developed and used for this purpose are mapping populations, high-throughput single nucleotide polymorphism assays and microarrays.

Extension

Raymond K. Leavitt 1952-1982 Extension specialist

Leavitt worked with swine and cattle breeders on sonoray evaluation.

Maurice Alexander 1960-1992 Extension livestock specialist

Alexander specialized in ultrasonic livestock testing.

Homer Sewell 1962-1989 Beef cattle nutrition

Animal sciences faculty 1980 to present

John Massey 1963-1992 Beef cattle genetics

Massey established the on-farm beef performance testing program and Central Bull testing program.

C. Melvin Bradley 1968-1985 Livestock judging team coach for eight years

Bradley came in first at American Royal in 1951 and 1957. He published two volumes of "Missouri Mule: His Origins and Times" and "Horses: a Practical and Scientific Approach."

John Rea 1968-1992 Swine nutrition

Rea developed statewide farrowing schools.

James E. Ross 1969-1985 Sheep and cow and calf production

Ross published "Beef Cow and Calf Manual 104."

George Garner 1983-1992 Agricultural biochemist

Garner established a forage testing program. He specialized in managing fescue toxicosis.

Ron Bates 1986-1994 Swine nutrition

Jack Whittier 1986-1993 Cow/calf nutrition and management

Jennifer Garrett 1992-1995 Dairy nutrition

David Lalman 1994-1997 Beef nutrition

William Herring 1995-2002 Beef breeding and genetics

Michael Brouk 1997-2001 Dairy nutrition

K.C. Olson 1998-present Beef nutrition and management

Olson emphasizes ways to capture a greater value from Missouri feeder cattle through improved growth, health and carcass performance. Olson teaches concepts in applied energy metabolism, and researches development of feeding management techniques that improve productive efficiency.

David Patterson 1996-present Reproductive physiology

Patterson is the coordinator and primary investigator for the Missouri Show-Me-Select Replacement Heifer Program and the coordinator of Miller Internship in reproductive management. His research and extension program focuses on the development and evaluation of economical methods of estrous cycle control for replacement heifers and postpartum, suckled beef cows

Tim Safranski 1996-present Swine genetics and reproductive management

Safranski conducts an integrated extension and research program in genetics and reproductive management. He teaches swine management. Safranski's research focuses on gilt development, management of early weaned sows, selection for placental efficiency and semen production and evaluation.

Marcia Carlson Shannon 1998-present Swine nutrition

Carlson Shannon's research and extension programming have emphasized trace mineral requirements of growing pigs. Her research has specifically focused on the supplementation of organic and inorganic trace mineral sources of copper and zinc on nursery pig growth performance, nutrient utilization, changes in intestinal flora, metabolic capacities and trace mineral excretion.

Barry Steevens 1978-present Dairy nutrition

Steevens' research focus is milking management and control of Staphylococcus aureus mastitis in the lactating dairy cow. Another area of focus is prepartum treatment of dairy heifers with an antibiotic to reduce the prevalence of first lactation mastitis. This work is in cooperation with professor Middleton of the College of Veterinary Medicine.

Bob Weaber 2004-present Beef cattle genetics

Weaber's extension programming focuses on the selection and use of breeds and sires within breeds to meet production objectives that optimize the use of additive genetic merit and leverage breed differences as a genetic resource and produce optimal levels of direct and maternal heterosis. His planned research activities include the validation of DNA markers and selection index tools, investigation of genetic adaptability to fescue toxicosis and evaluation of the use of two-breed stabilized composites for beef production in Missouri.

Animal sciences faculty 1980 to present

Molecular Biology

Clifton Murphy 1986-present Professor of research, swine reproductive physiology

Jeff Moffat 1987-1992 Molecular biology

Russell Anthony 1986-1992 Molecular biology

Carl Pinkert 1986-1989 Molecular fetal biology

Randall Prather 1989-present Swine reproductive physiology and molecular biology

Prather's research includes In vitro embryogenesis, transgenic pigs, cloning of pigs and transcriptional profiling

Matthew Lucy 1993-present Dairy molecular endocrinology

Lucy's research is focused on mechanisms controlling nutrient partitioning in dairy cattle and the interaction of these mechanisms on the reproductive axis. Primary metabolic hormones of interest are growth hormone, (IGF)-I and insulin. Reproductive tissues studied include the ovary and uterus. Studies are conducted at the whole animal level and the molecular level.

Michael Roberts 1985-present Sheep and cattle molecular biology

Roberts' main research goals are to characterize and determine the function of a new and extensive family of Kunitz inhibitors expressed in trophectoderm of cattle and sheep and determine how the IFN-τ are different from their close relatives in the way they initiate signaling in the uterine endometrium of sheep and cattle.

William Trout 1994-1998 Molecular biology

Jonathan A. Green 2001-present Molecular biology

Green's research focuses on interactions between the placenta and the maternal system. He studies the role of pregnancy-associated glycoprotein families expressed at the placenta-uterine interface. Green teaches gamete and embryo development and animal science laboratory practicum.

Edmund Rucker 2000-present Molecular reproductive biology

Rucker's main goals are to determine genes that regulate the survival of cells within the gonads and mammary gland, and to generate large animal models of disease. His lab uses transgenic and knockout technologies to develop murine and large domestic animal models for study. Within the gonads and mammary gland, he examines how cell growth and cell death change within stem cells that lack or overexpress specific apoptotic genes. With this information, he can understand how these cells are normally lost in cases of lactation defects and reproductive infertility.

Peter Sutovsky 2001-present Reproductive physiology

Sutovsky's research emphasis is on the role of ubiquitin system in mammalian spermatogenesis, epididymal sperm maturation, fertilization and zygotic development as it is applied to assisted reproduction, organelle inheritance and development of novel diagnostic tools, infertility treatments and contraceptive techniques. He teaches Gamete & Embryo Biology 433 and guest lectures in Gonadal Function.

Production

C.V. Ross 1946-1984 Sheep production and management; chair

Ross published "Sheep Production and Management" in 1989.

Q.B. Kinder 1947-1982 Poultry farm management

Horace S. Peet 1946-1984 Dairy farm management and nutrition

Ron Morrow 1976-1994 Cow and calf production and management

Jerry Lipsey 1982-1996 Beef cattle production and management; judging team coach

Instructors

Janice Bowman 1980-1988 Ruminant nutrition

C. Ross Hamilton 1979-1981 Livestock judging team coach

Eric Farrand 1998-1999 Livestock judging team coach

David Kemp 2003-present Livestock judging team coach

Animal sciences faculty 1980 to present

Jesse Lyons 1972-present Computer analyst

Lyons supports the computer systems; he serves as poultry specialist for 4-H and FFA programs at state and national levels and contributes to small flock extension efforts and poultry nutrition and management extension.

Erika Berg 1998-present Instructor

Berg teaches in the areas of monogastric production, equine breeding and management and horse production, selection and evaluation.

Appendix C

Alumni letters

UNIVERSITY OF MISSOURI
Extension

Lawrence County Extension Center
Courthouse, P.O. Box 388
Mt. Vernon, MO 65712
Phone: (417) 466-3102
Fax: (417) 466-7299
Email: lawrence@missouri.edu
Web site: http://extension.missouri.edu/lawrence

June 22, 2005

To: Jim Williams and Mike Smith
University of Missouri Division of Animal Sciences

Re: Animal Science Division's Impact

I can easily relate to the University of Missouri Animal Science Division's impact on my life. In fact it has been a big part of my life since I enrolled at the University in 1958. I received a Bachelors and Masters degree from Columbia. Following that, I began my career with University of Missouri Extension. During my career I've worked primarily with livestock programs having been the livestock specialist at Mt. Vernon since 1968.

I've never had any regrets about my choices for my education or career. The training I received as a student from G.B. Thompson, Rodney Preston, John Lasley, Bill Day, C.V. Ross, Jim Comfort, Leland Tribble and A.J. Dyer provided a very sound footing for what lay ahead.

Not only were the faculty helpful, it's rewarding to recall the students, both graduate and undergraduate, that I came in contact with. Many have become leaders in the livestock industry of Missouri and other states as producers, educators, journalists, political leaders and allied industry personnel.

As an extension specialist, I was fortunate to be guided in the 1960's and 70's by state extension specialists Melvin Bradley, Homer Sewell, Jim Ross, John Massey and John Rea. They helped move Missouri extension programs from the generalized county agent system to one of area specialization.

State extension specialists played a big role in those years in the cooperative feeder cattle and pig sales, the on-farm beef testing program, the state and regional tested bull sales, swine test stations, sonoray (ultrasound) measurement of swine and beef cattle, short courses for the different species, the state cattle tour and the cattle feeders seminar, to name a few.

About the same time, the research effort on crossbreeding beef cattle at Spickard raised quite a few eyebrows among cattlemen in the state. This effort helped drive home the economic benefits of hybrid vigor and those lessons are still helping today.

(Over)

(continued)

More recently the Show-Me-Select Beef Replacement Heifer Program has helped the state's beef industry. Led by Dave Patterson, the heifer development program has aided in teaching estrus synchronization, artificial insemination and expected progeny difference (EPD) usage. Both basic and applied research by animal science staff members has established the University of Missouri as a top-notch animal reproduction leader.

It's impossible for me to place a value on the dollars generated for the producers of the state who have been involved in the various programs. Most have definitely added value to feeder livestock and breeding animals that have gone through the different sales.

Perhaps the best is yet to come from the animal science division. There are sharp new staff members, extremely intelligent students and certainly there are challenges for them to face. I'm confident folks will reflect back in 10, 25, 50 years or more and point out how the animal science division helped everyone in the 21st century.

Yours truly,

Eldon

Eldon Cole
Livestock Specialist

Ashland, Missouri
July 25, 2005

MU College of Agriculture
Division of Animal Sciences
920 East Campus Drive
Columbia, MO 65211-5300

Re: Centennial Document. Per letter dated June 14, 2005, signed by Mr. Jim Williams And Mr. Mike Smith.

Dear Friends:

I appreciate being asked to prepare a letter reflecting what the department has meant to me in my education and preparing me for my chosen vocation and career; and on the possible impacts which may have been made on the livestock industry in the state and the nation.

Since we are considering the past one hundred years of history, perhaps it is appropriate that I should begin by relating the impact the various departments of the College of Agriculture had in assisting my father and, (perhaps less directly) my mother as well, in selecting a life long career and providing the training required to succeed.

To explain, following the end of World War I, the U. S. Government offered a program of training for veterans which included courses of study in agriculture. These courses included animal husbandry (beef, dairy, swine, equine, sheep, and poultry) as well as field crops, horticulture, gardening, and farm record keeping.. The MU College of Agriculture provided these courses at the Columbia campus. However, since there were more students in Missouri than the University could accommodate, additional training schools, under the Veterans Administration, were established at the Missouri Poultry Experiment Station at Mountain Grove, at the former Carlton College at Farmington, and at Marionville.

My father, Fred Cervinka, Sr., enrolled in the program at the Carlton College location at Farmington in 1922. and, as I understand, completed the studies in 1925. Although he was very interested in all the various courses and felt all would be needed in establishing a general farming operation, the courses that appealed to him the most were the poultry husbandry courses. I feel this special interest may have been fostered, at least somewhat, by the very fine instructor teaching the poultry courses. This instructor was Ernest M. Funk who later came to the MU Poultry Department; first as an instructor, then as a professor, and eventually serving as the head of the department.

Following completion of the study program in 1925, father and mother purchased a farm near Farmington as they both liked the area and the town. They did have beef cattle, several dairy cows, a brood sow, a horse, a sizeable orchard and garden.; but a

flock of laying hens was their favorite project. The number of laying hens was expanded with each passing year. New brooding and laying houses were built (from MU Poultry Department plans), and in 1929 father installed one of the first farm electric generating systems in the area. Of course the house was wired for electricity, but more importantly, the poultry laying houses were wired with lights to promote better egg production during the short days of winter.

By this time father owned the largest egg producing flock of hens in the county and in that area of the state. He started a weekly route delivering eggs direct to customers in St. Louis. And, at this time, the first incubator was purchased to hatch the baby chicks that were needed each year for flock replacement. In the following years, more incubators were put into operation to produce baby chicks for sale to neighbors and throughout the local area. My father was considered to be the local authority on poultry management, nutrition, and diseases and was often called on for help with problems and to diagnose and advise on treatment of poultry diseases and parasites.

Unfortunately, following a period of illness, father passed away in August, 1937; about two months before my thirteenth birthday. Mother continued to operate the farm with the help of an occasional employee and, of course, with the limited help of myself and two younger sisters. In 1945, after the youngest sister graduated from high school, she sold the farm and moved to Columbia . A home and small acreage was purchased just outside the city limits and less than two miles south of the University campus. This provided a home for her and my youngest sister, Marie, who enrolled in the MU College of Agriculture in the fall of 1945. Mother found employment as office manager with a small local business.

Now, as for myself, I first came to the University in the fall of 1941 and enrolled in the College of Engineering. I attended two semesters; was away during World War II, and returned for the fall semester of 1946. Following World War II, the U.S. Congress passed the GI Bill of Rights offering college or vocational training to all veterans of that war. This made it possible for many, including myself, to pursue a college education which, otherwise, might have been difficult to do. During the years I was away, I made the decision to change my field of study from engineering to agriculture and to major in Poultry Husbandry, which I did.

I was pleased to find that Professor Funk, the same man who had taught my father in 1922 to 1925 had been assigned to be my student advisor! The first time I entered Professor Funk's office and handed him my paper work, he immediately recognized my name, and said "Well, It appears I will be teaching the second generation of Cervinkas."

Certainly, Professor Funk advised me on courses I should enroll in and the scheduling of these courses. But just as important, he suggested and arranged part-time and full-time seasonal employment opportunities in the field of poultry. These experiences proved to be just as valuable to my education as did the course work and, of course, the supplemental income they generated was very much appreciated.

I was first given the opportunity to work 20 hours per week on the University Poultry Farm.. Then, in 1947, I was offered the opportunity of seasonal employment (August to December) as a state hatchery and flock inspector with the Missouri Poultry Improvement Association (MPIA). MPIA was an organization comprising the more than two hundred hatcherymen in the state participating in the National Poultry Improvement Plan (NPIP) administrated by the U.S. Department of Agriculture. Objectives or goals of NPIP were to improve the breeding quality and the control and elimination of diseases in hatchery breeding flocks and, consequently, in the baby chicks (also turkey poults and other poultry) being distributed to farmers and growers throughout the U.S. as well as poultry being exported.. Professor Funk was the Executive Secretary of MPIA which maintained offices in MU Poultry Department's Building T-14 which was located at the corner of College Ave. and Porter St. adjacent to the University Poultry Farm.

I worked seven seasons (1947 to 1954) with MPIA which gave me the opportunity to meet and work with a large percentage of hatcherymen and breeders throughout the state and to learn much about this field of the poultry industry. Also, I worked with most of the faculty and staff at the Poultry Department as well as the Veterinary Department.

Professor Funk also arranged several summer job opportunities with the U.S. Dept. of Agriculture in poultry inspection and grading at a commercial poultry processing plant; and one summer gathering statewide data for a research project on egg marketing.. Of course, my participation in these employment opportunities (and the starting of our own hatchery business in 1948) meant that I could engage in classes only one semester and/or summer session per year. As a result, I did not receive my BS in Agriculture until 1955. And, since the Agriculture curriculum, at that time, did not include business courses, I decided these would be important for me and followed up with two additional semesters in business school.

I have mentioned starting our hatchery business in 1948. While it had not been my intention to begin a business this early, certain occurrences lead up to doing this. To explain; when working part-time at the University Poultry Farm in early 1947, I was working alongside a graduate student whose name was Harold Biellier. Harold and I quickly became friends and, of course discussed many things while working closely together

One day we were discussing the fact that geese being marketed for the holiday trade

brought growers an appreciably higher price per pound than prices being paid at the same time to growers of turkeys. We were both aware of this but Harold indicated that he thought this price difference in favor of geese appeared to be unwarranted. He pointed out the fact that, following a short brooding period, the young geese could then thrive and grow by grazing pasture grasses and clovers. On the other hand, it was necessary to continue feeding young turkeys high cost commercial growing rations throughout their growing period. Also, geese were rarely affected with diseases or parasites whereas this was an extremely serious and costly problem (and especially at that time) with the rearing of turkeys.

This interested me and I told Harold that, perhaps, we could try raising a small flock of geese as a trial. As I have mentioned earlier, my mother had purchased a small farm less than two miles from the university. Unused pasture land was available as well as a small building which could be used for brooding and sheltering the goslings. We talked about this and was encouraged by my mother. We decided to purchase one hundred baby goslings for our trial. However, after searching the classified ads in poultry and farm magazines and publications, we found that there simply were not any hatcheries offering baby goslings.

We finally placed an order with a farmer in Indiana offering a few goslings which he hatched by incubating the goose eggs under chicken hens.(to allow geese to hatch the eggs would result in no more eggs being laid by the geese for remainder of the season). Our order for 100 goslings would require all the goslings the farmer expected to be able to produce and he doubted that he could supply our full order. Since we had no choice, we told him to ship as many goslings as possible over a three week period. A total of seventy goslings were received by parcel post, arriving in perfect condition.

As I recall, we raised every one of the goslings with no losses. And, yes, we found the geese thrived very well on pasture although we did provide a little supplemental grain. However, since it was not possible to purchase baby goslings in quantity, Harold and I decided we should keep all our geese (females) plus the appropriate number of ganders (males) to produce hatching eggs. We purchased a small used Jamesway commercial incubator which we adapted for hatching goose eggs. We did our first hatching in the spring of 1948 with fair success. Since more goslings would be hatching than would be required for our needs, we placed a classified ad in the Kansas City Star weekly newspaper offering goslings for sale. To our amazement, we quickly received orders for far more goslings than we could supply.

This encouraged us to greatly increase our breeder flock and to purchase a new, much larger incubator, especially designed for incubating goose eggs. Further increases were made in the following years with more and larger incubators, more breeding flocks, and the hatching and offering of ducklings as well due to customer demand.

Up to about 1952 Harold and I both worked part-time with the hatchery business with Harold's wife, Betty, performing the office work. It was about this time that Harold made the decision to accept a full-time position with the University Poultry Department as he was very much interested in doing poultry research and teaching. He sold his interest in the business to me and I continued with the help of an employee and my wife, Mary, doing the office work on a part-time basis. Two years later, in 1954, I made the decision to devote all of my time to the business and discontinued my seasonal employment with the Missouri Poultry Improvement Association

For some time, orders for significant numbers of goslings were being received from farmers and growers who reared them to use for grass and weed control in a variety of crops. A large percentage were used in cotton fields but also in strawberries, bramble fruits, orchards and groves, Christmas tree farms, commercial growers of nursery stock, and commercial growers of mint, onions, potatoes, and other specialty crops. Young as well as old geese used for this purpose came to be known as "Weeder Geese"

Numerous growers told us they would use geese but did not have suitable buildings and facilities, nor the time and "know how", (and inclination) to rear baby goslings. Since it appeared there could be sufficient demand for young "field ready" weeder geese, decision was made to make arrangements for production, sale, and distribution. Local growers having sizeable poultry houses were contacted and arrangements made for brooding and rearing baby goslings to an age of eight weeks at which time they were about half grown, well feathered, and ready to be placed into the fields.

The first year, we paid a trucker of poultry to make deliveries to customers for us. The truck s were equipped with special trailers for transporting live poultry and turkeys and each trailer had a capacity for moving 3,000 young geese per load. On hauls requiring 24 to 48 hours, or more, the cages or coops were equipped with troughs for feeding and watering the birds periodically. The tractor trucks were equipped with "sleeper cabs" allowing one driver to rest and sleep while the other drove. This allowed the trucks to continue moving until the geese were delivered to customers.

Production was increased for several succeeding years and we purchased three trucks equipped with poultry trailers. We continued producing and selling weeder geese thru the 1962 season. At that time, effective chemical herbicides came into use and the use of weeder geese was discontinued. We then made a change to producing mature market geese for several years but this did not prove profitable and was discontinued.

The production of baby goslings and ducklings continued. More breeds were added and, during the next few years, other classes of poultry and game birds were added (turkeys, guinea fowl, pheasants, quail, bantam chicks, etc.). More incubators were added in a separate building for hatching turkeys in sizeable numbers. From the 1970's to 1990.

weekly hatching volume ranged from 30,000 to 50,000 baby waterfowl, turkeys, other poultry and gamebirds comprised of some sixty breeds and varieties. Shipments were made to retail customers, commercial growers, dealers, and distributors in every state. Including Alaska and Hawaii, as well as to Canada, Mexico, Central and South America, Caribbean islands, southeast Asia, etc.

Mary and I retired in 1991 after completing 43 years of operation. The business was sold and we are now living in the town of Ashland, fifteen miles south of Columbia. I should mention that Dr. Funk continued to maintain an interest in my activities and would make frequent visits thru the years. He, and other department faculty, would often tour our hatchery and farm operation with poultry students and visitors to the department from other institutions, industry, and foreign visitors. Dr. Funk certainly did go "the extra mile" in serving as my student advisor. He, as well as other department faculty members, past and present, who have influenced my career and life in so many ways have my deep gratitude and appreciation.

And again, since we are concerned with happenings during the past one hundred year history of the departments, please allow me to make mention of another of my family whose life and career was much influenced by her associations with the MU Department of Animal Husbandry. I am referring to my younger sister, Marie L. (Cervinka) Ingram, who received her BS in Animal Husbandry and Agricultural Journalism in, as I recall, the spring of 1949.

Marie earned the distinction of being the first woman student to serve on the University Livestock Judging Team and was also a member of the Block and Bridle Club. And, she did not drive, bicycle or walk the two miles from home to the campus. Instead, she rode her horse daily, having made arrangements to stable it at the MU Horse Barn while she attended her classes!

While a student, Marie worked a summer job with the American Hereford Association. Following graduation, she accepted a position in the Editorial Department of the Hereford Journal and also became a free lance writer and photographer preparing articles and photos (including cover photos) for the Journal, other publications and for breeder clients; and covered livestock sales, shows, conventions, etc.

When growing up on the family farm, Marie would often announce her intention to "go west", when she grew up, and "marry a cow boy". And, this is exactly what she did! When doing promotional work for a prominent cattle breeder in Colorado, she met her future husband. Doyle Ingram was a ranch manager, rodeo rider and real life "cow boy". They lived their entire lives, until retirement, on several ranches in Colorado and Wyoming. Doyle's recent health concerns made it necessary to move to a lower elevation and they are now living on a small "retirement ranch" near their youngest

daughter and family in southern Nebraska. You may be sure they still have their horses which they ride nearly every day.

I am asked to "reflect on what the department has meant to me as well as its impact on the livestock industry over the past 100 years". I believe I have already "reflected" quite enough as to what the department has meant to myself, as well as to my father, and to my sister as regards our lives and careers.

With my career being devoted to the poultry industry, I feel I should leave it to others with more knowledge and experience to "reflect" on the impacts on the livestock and animal industries. However, I have noted that many cowboys now ride ATVs rather than horses; that few farmers (or their wives) no longer know how to milk a cow; pluck and dress a chicken, harness a team , or to "slop" the hogs. This, and much more, was required "know how" when I grew up on a farm in the 1930's and 1940's.

As regards the poultry industry, it appears to me that the most drastic change has been the transfer of production of chickens, eggs, turkeys, etc. from small and medium sized farmers and growers to a few giant sized integrated corporations. These corporations not only control the growing of poultry and production of eggs, but operate the hatcheries producing the baby poultry, feed mills producing the feeds, the processing plants, as well as the marketing and distribution.

Gone are the days when chickens and other poultry could be seen ranging outdoors on nearly every farm and motorists had to be on "the lookout" for chickens crossing the road. Now, all poultry is confined by the thousands in monstrous buildings hundreds of feet in length. Laying hens are not only confined in buildings, but in very small laying cages in which they scarcely have space to turn around: simply machines in these giant "egg factories".

Gone are the hatcheries formerly located in nearly every small country town, and the larger "mail order" hatcheries shipping baby chicks and other poultry to farmers and feed store dealers all over the country. Here in Missouri, the number of hatcheries declined from approximately 230 in the 1940's and early 1950's to only a "handful" serving the needs of mainly hobbyists, children raising poultry for 4-H projects, and a few who still raise poultry for their own home use. However, I should mention that in recent years somewhat of a revival has been occuring in farm production of (and demand for) "range reared" and "organically grown" poultry and eggs. On recent visits to several farmers' markets, I have talked with a half dozen, or more, producer vendors offering not only "organically raised" dressed poultry and eggs, but beef, pork, lamb, and even Ostrich meat as well. One egg producer maintained a significantly large flock of 800 laying hens and marketing to supermarkets as well as the farmers' markets.

And, of course, the small town produce houses offering farmers a market for poultry, eggs (as well as cream) are long gone. The feed stores no longer sell large volumes of poultry, dairy, or even hog feeds with demand shifting to horse and pet feeds, bird seed, gardening tools and supplies, etc.

Other important changes in the poultry industry include, of course, the tremendous improvement in meat qualities, higher egg production, feed conversion, etc. that have been achieved thru breeding and genetics. Greatly increased knowledge of optimum nutrition for poultry achieved thru the vast amount of research that has been conducted thru the years is tremendously important.

Also very important is the research and effort resulting in the elimination and control of numerous diseases that previously resulted in serious and even disastrous losses in poultry flocks. New vaccines, blood tests, drugs and medications as well as improvements in sanitation practices and products combined to make this possible.

These, and other changes not mentioned, have certainly contributed vastly to the quality and quantity of poultry and egg products and to greatly improved efficiency and costs of production. Consumers today enjoy the benefits in the form of a vast array of poultry and egg products available and, at very reasonable cost..

Much credit for this research and development is certainly due to members of the staff at the MU poultry department and to the student graduates who thru these years have all contributed to this vast storehouse of knowledge, and to those who have implemented new research and ideas and made them a working part of all aspects of the industry. For a partial listing of research performed at the MU Poultry Department and publications, I refer you to the book entitled "History of the Department of Poultry Husbandry" written by Dr. E. M. Funk..

Respectfully submitted by

Fred Cervinka

Fred Cervinka
BS in Agriculture, 1955.

United States Department of Agriculture

Research, Education, and Economics
Agricultural Research Service

September 5, 2005

Drs. Jim Williams and Mike Smith
College of Agriculture
Food and Natural Resources
Division of Animal Sciences
S108 Animal Sciences Center
920 East Campus Drive
Columbia, MO 65211-5300

Gentlemen;

It is difficult to express in words the respect, admiration and gratitude I feel for the Dairy Husbandry Department of the University of Missouri. The training I received in academics, professionalism, and passion for meeting the highest expectations began with my B.S and M.S. degrees in Dairy Husbandry. The Animal, Dairy and Poultry Departments have a long history of accomplishments that was upheld by the professors that taught and guided me such as Drs. Campbell, Martz, Lasley, Preston, Curtis, Anderson, and many others. Their enthusiasm and dedication to their students and research encouraged me to try to follow in their footsteps. Their example led me to an enjoyable and satisfying career. For this I owe the Dairy Husbandry Department a tremendous debt of gratitude.

There are numerous experiences that come to mind when I think of my days in the Dairy Husbandry Department - meeting Dr. Klieber during his visit for one of the first Brody lectures, receiving the Ragsdale scholarship from A.C. Ragsdale, or working in the laboratory as an undergraduate on Rex Ricketts' research. I remember Dr. Campbell's passion for teaching and advising, and how badly WE felt when the class did not do very well on an exam in his introductory dairy science class. The quotes he used to connect his instruction to past ideas and thoughts will always be appreciated. I am indebted to Dr. Campbell for the advice and encouragement that helped me make important life decisions. I will always remember my rigorous M.S. thesis examination by Dr. Martz and others, and the long wait to get the acknowledgement that I had passed.

Although course work was an important part of the legacy given to me as a graduate of the Dairy Husbandry Department, my greatest connection to the Department is related to the many outside-of-class interactions and opportunities that the faculty provided. I cannot measure the value of my activities in the Dairy Science Club and Dairy Cattle Judging

U.S. Dairy Forage Research Center
1925 Linden Drive West, Madison, WI 53706-1108
Voice - 608-264-5240 FAX - 608-264-5147
Midwest Area

Team. These activities created many connections with fellow students and faculty in the Department that will always be dear to me - connections that shaped my outlook, my ambitions, and my interactions with others.

Congratulations to the Departments of Animal, Dairy and Poultry Husbandry on their 100-year anniversary. The impact of these departments on individual students and the animal industries of Missouri and the nation are incalculable. They leave an enormous legacy to the Division of Animal Sciences in the College of Agriculture Food and Natural Resources at the University of Missouri. I wish them every success in the future to match or exceed the legacy of their past.

I will always be a proud alumni of the Dairy Husbandry Department,

David R Mertens

David R. Mertens
Research Dairy Scientist
Graduate of the Dairy Husbandry Department
B.S., 1969
M.S., 1970

University of Missouri Dairy Department Centennial
Comments by W.P. Warren, Ph.D., 1976

I would first like to thank Dr. Fred Martz for asking me to provide some comments for the Centennial history collection. Fred was my advisor, mentor, and friend during my pursuit of two graduate degrees, and I will always be grateful to him. I enjoyed my relationship with him as well as with his family. The hours spent fishing at his farm pond was a great way to get away from the stress of graduate studies. It has been a long time since I have had a mess of bluegill.

After initially graduating from MU with a degree in agriculture education and then teaching vocational agriculture in southern Missouri, I contacted the dairy department in order to enter a graduate program. I had grown up on a small dairy farm and had enjoyed the dairy and animal science courses I had taken as an undergraduate. I also wanted to get an advanced degree that would be beneficial to working in developing countries, toward which my interests were leaning at that time. Discussions with Dr. Martz convinced me I was on the right track pursuing a degree in the animal science area with a focus on nutrition.

The background courses, training, and research experience I obtained while conducting my graduate work in the dairy department has served me well throughout my career in International Agricultural Development. I feel certain it has also benefited the various developing countries where I worked, and particularly benefited U.S. universities that were involved in and conducting research on the agricultural programs being implemented in those countries. University of Missouri professors and former students from the dairy and animal science departments as well as other departments have been involved with many of these programs including Title XII programs that I helped develop and implement in several countries. My relationship with some University of Missouri professors has been interesting and challenging over the years as we worked in various developing country situations. One case in particular demonstrates how far our relationship had developed and would go. It was not so much my degrees but the loan of the shirt and pants off my back to one professor while he was in an African country with me that enabled development work to be conducted. While traveling in developing countries in particular, one's suitcase does not always travel on the same plane with you or ever show up again once it is checked in for a flight.

My work with agricultural ministries and research institutions around the world brought me in contact with numerous foreign graduates from the University of Missouri Animal Science Department as well as other university departments. It made for more meaningful working relationships.

I am very grateful to the professors and staff of the former dairy department and the animal science department as well as the collaborating departments for their support and encouragement during my years at the University of Missouri. I have many fond memories of the professors and other graduate students of the dairy department. And who could forget the old labs we used for offices, the old barn where we conducted many hours of nutrition studies. The loft of the old barn was a great place to finish growing out the chickens and turkeys left over from our poultry science nutrition courses for later graduate student consumption.

One thing I will always remember about the dairy department is the excellent ice cream it used to serve. The long lines on hot summer afternoons waiting to get a big cone are not forgotten. I hope they are still available to the new generation of students, staff, and the public.

I want to wish the University of Missouri Animal Science Department continued success during the next 100 years. Your excellent reputation and fine traditions in the service of agricultural development around the world deserve to endure into the future.

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andhil@swbell.net
www.andhil.com

August10, 2005

Dr. Fred Martz
Room S-103 Animal Science Center
University of Missouri
Columbia, MO, 65211

Re: Centennial Letter on Departments of Dairy and Animal Husbandry

My experience with the Department of Dairy Husbandry began in the fall of 1963 as an incoming freshman majoring in dairy husbandry. Over the next 5 years, that experience broadened to include courses in animal husbandry, a B.S. in Dairy Husbandry, and an M.S. in Dairy Cattle Nutrition. During those 5 years, my closest faculty associations were with John R. Campbell—my undergraduate and M.S. advisor, Fred Martz—officemate with John Campbell and on my M.S. committee, Bob Marshall, John Sikes—dairy cattle judging team; and in the department of animal husbandry with Rodney Preston—M.S. Committee, and C.V. Ross. Those associations have lasted a lifetime and still continue.

What did I learn? I received an excellent base through courses taught by these professors; which formed the impetus for me to go the science route and eventually resulting in my receiving the Ph. D. in animal nutrition from Cornell University. That would not have occurred were it not for the encouragement and confidence I gained that this was a route that I could handle and would profit by in many ways as a career. It also helped me to decide to broaden and change areas of interest at Cornell for my thesis to a major project on growth and development of cattle. That in turn provided a basis for my work in calves and heifers at Ralston Purina, which in turn has provided me the expertise in my consulting work in the U.S. and in other countries, and in writing regular columns in *Feedstuffs* and periodic columns in *Hoard's Dairyman* in the calf and heifer subject area.

But I learned much more than that. I learned the value of participating in clubs and ag campus organizations, of interacting with other students and faculty members outside of the classroom, of assuming the responsibilities of leadership roles, and in repaying, in a sense, the personal advising and care that students in the College of Agriculture received then and still do. I also learned the value of a sense of pride in that heritage, and in seeking and taking the opportunity to pay forward that heritage to the department, college, university, and in other life endeavors. And on occasion, my wife, who is also a Mizzou graduate, would remind me how fortunate I was to have been in that environment, and to consequently benefit for a lifetime.

Sincerely,

Al Kertz

Alois (Al) F. Kertz, Ph. D.

Animal Sciences faculty, professors emeritus, staff and graduate students in front of the Animal Sciences Research Center in September 2005.

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Resources

Missouri Agricultural Experiment Station