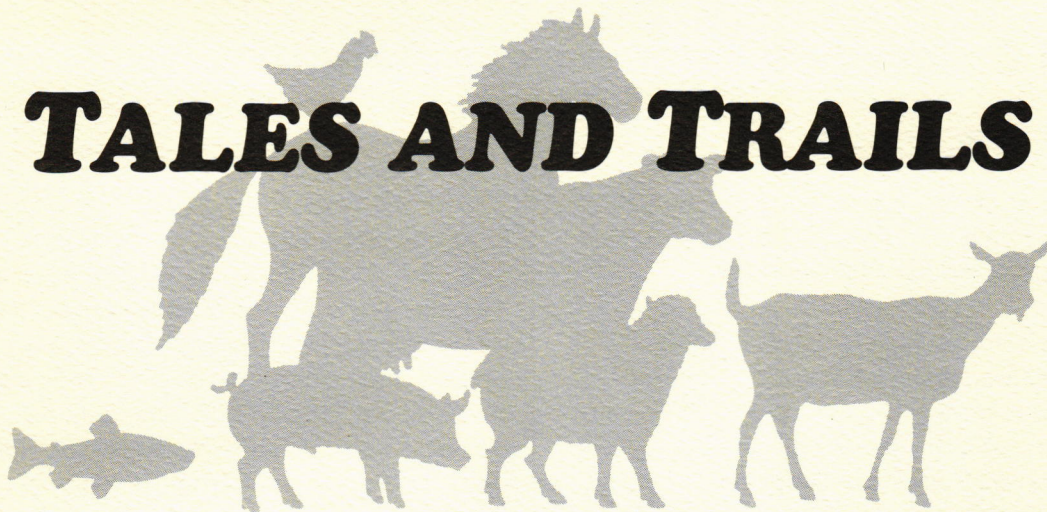


TALES AND TRAILS



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Polymerase Chain Reaction Used to Identify Genes in Dairy Cattle

Animal Science Assistant Professor Juan F. Medrano and School of Medicine scientist Estuardo Aguilar-Cordova have successfully developed a research method that identifies milk protein genetic variants at the DNA level in dairy cattle. This knowledge will enable the selection of cows and bulls carrying genes that will increase the quality and yield of cheese.

Dr. Medrano's procedure is based on the polymerase chain reaction (PCR) technique. The procedure is carried out in a computerized piece of equipment called a thermal cycler that heats a sample of DNA at various temperatures and results in the production of millions of copies of the milk protein genes. Dr. Medrano and his assistants have developed the system to type the kappa-casein variants A and B and the beta-lactoglobulin variants A and B. These are important genetic variants affecting milk composition, coagulation time and cheese yield, thus influencing manufacturing properties.

DNA can be extracted from saliva, blood, semen, or milk, or any tissue containing nucleated cells. The PCR procedure can be accomplished in a matter of hours, involves no radioactive materials, and once designed, would cost little to genotype an animal. Other traditional DNA analyzing techniques using DNA probes are time consuming, technologically demanding and require several days to perform.

PCR has widespread application. It has been recently used as a diagnostic tool in AIDS, allowing diagnosis in newborn humans at birth, so that healthy, uninfected babies can be isolated from infected mothers before nursing or other close contact. It has also been used for identifying genetic mutations that produce diseases such as muscular dystrophy, sickle cell anemia and cancer.

Dr. Medrano and graduate student Alison Van Eenennaam are conducting a survey of milk protein gene frequencies in the California dairy cattle population. With the collaboration of his staff research associate, Linda Sharrow, and graduate student, Eric Aasen, Dr. Medrano has now extended the PCR technique to classify bovine beta-casein genetic variants and also has developed a procedure for sex classification in cattle, sheep, goats and humans.

The utilization of milk protein typing will be of interest to animal geneticists, dairy scientists, companies owning sires for artificial insemination and to the individual dairy producer. The PCR technique could be designed to type embryos for particular qualities and to sex them before implant into recipient cows; the identification of genetic diseases in animals is another use.

Dr. Medrano's PCR research was featured in the March 16 issue of the New York Times.

Animal Science Alumni Survey Results

by James H. Meyer

Information presented is based on a survey taken by Chancellor Emeritus Meyer of Animal Science alumni who graduated between 1956 and 1987.

As reported in the last issue of Tales and Trails, my survey of alumni drew the conclusion that the animal science major is sound in terms of student numbers and alumni with successful careers. There are, however, concerns and issues which need to be addressed to ensure that successful teaching programs meet the needs of students and alumni for the 21st century. The following is a report on opinions and suggestions of animal science alumni for improvement in University education, specifically improvement in the animal science curricula.

FUTURE PLANS OF ALUMNI

At the time the survey was taken, approximately 60% of the alumni were actively planning for their futures. Of these, 26% planned to continue their education for an advanced degree. This group was led by school educators, college academics and physicians, dentists or lawyers, laboratory or medical scientists, government workers, and a group representing miscellaneous careers. One-fourth planned to change their fields of employment. One-fifth sought to advance in rank or improve their specialty, while another one-fifth would expand their business or obtain ownership. About eight percent of the alumni planned to include ranching or animal ownership with their other employment activities, as either a supplement enterprise or avocation. This was especially true among those who classified themselves as homemakers.

PERSONAL ATTRIBUTES

A list of personal attributes was presented to the alumni who were asked to rank these as to degree of importance to career success (Table 1). Analytical ability or problem solving was considered most important by 24% of the alumni, with communication skills and ability to work with people following closely as important attributes. Approximately 10% of the alumni rated technical knowledge, managerial ability, and ability to develop new knowledge, as most important. The development of personal values was considered most important by 7%, whereas environmental concerns and cross-cultural understanding of others was not considered critical. Date of graduation of alumni appears unrelated to responses, with little variation occurring among the various graduating classes.

UNIVERSITY PREPARATION

Over 90% of the alumni felt that university preparation for their first and current career was adequate, and of these, 58% felt that it was more than adequate. Veterinarians, ranch owners or managers, students, college academics, physicians, dentists, lawyers and those in government or military service found their preparation more than adequate for their current career. Those in the remaining careers were not as laudatory concerning their university preparation for their current careers. Even so, 85% of those responding felt their preparation was at least adequate or better. Frequency of overall university preparation for post-graduate education was excellent: 98% reported their preparation was adequate; of these, 77% reported it as being more than adequate.

PROGRAM MODIFICATION

The open-ended question, "If you could repeat your undergraduate education today, with the advantage of your present knowledge and experience, what changes would you suggest be made in the animal science program?", was asked (Table 2). The change most frequently proposed was "more practical courses." Defined more specifically, responses showed 20% asked that course work include more practical subject matter, more laboratories, field trips or discussions. Work experience or internships with opportunity for hands-on experience with animals were suggested by a number of respondents as examples of practical courses. Those from urban areas particularly felt the need for animal experience.

Inclusion of more business and economics courses appeared as the next most important suggested change. Such additions were rated as essential by farmers or ranchers and business owners or managers. A need for more general education (how the world works) was ranked high on the list of priorities by computer analysts and those working in colleges or universities. A significant number of people, such as laboratory or medical scientists, veterinarians and business owners and managers, also noted general education as important. A significant number of laboratory or medical scientists, students and government administrators or analysts requested more research, science and theory courses.

My conclusion is that two career areas appear to be emerging, one requiring primarily a science background, the other requiring technology and a strong grounding in business, economics or enterprise management. I would

propose that two distinct undergraduate majors be offered through an animal science department: one, a discipline-oriented major emphasizing sciences and the application of science to animal biology; the other, a profession-oriented major emphasizing the application of science to animal agriculture and management skills for the animal industries. Examples of those interested in the major with a greater science application are veterinarians, laboratory scientists, students, government or military personnel, and those going into college teaching, research or extension. Business owners or managers, ranch owners or managers, salespersons and homemakers might be more interested in a profession-oriented major emphasizing the application of science to animal agriculture and management skills for the animal industries. Fortunately, the Department of Animal Science has the animal science major, which is discipline-oriented, emphasizing sciences and the application of science to animal biology. The Department is the major participant and leader in the agricultural science and management major-animal science emphasis, which is a profession-oriented major with significant course work in managerial economics leading to emphasis on management skills for the animal industries. The Department is currently examining the undergraduate teaching program with a goal of further improvements.

Table 1. Most Important Personal Attribute for Career Success

<u>Attribute</u>	<u>Percent</u>
Analytical Ability	24
Communication Skills	18
Working with People	16
Technical Knowledge	11
Managerial Ability	10
Develop New Knowledge	8
Personal Values	7
Environmental Concerns	4
Cross Cultural Understanding	2

Table 2. Adequacy of UCD preparation¹ for Current Career and Suggested Changes

Alumni Career	UCD Preparation	Practical Courses	<u>Suggested Changes</u>		
			Business, Economics	General Education	Research, Science & Theory
Veterinarian	77	24	14	18	8
Lab. Scientist	52	5	9	15	28
Business owner or Manager	43	16	26	15	4
Ranch owner or Manager	65	41	34	3	5
School Teacher	68	37	6	14	14
College Professor, Researcher or Extensionist	79	15	6	28	11
Government or Military	70	12	16	8	24
Salesperson	56	22	18	4	4
Homemaker	23	13	21	4	12
Doctor or Lawyer	71	17	8	8	17
Student	69	25	5	11	21
Miscellaneous	34	19	12	13	7
Mean	58	20	16	13	12

¹ More than adequate.

LETTERS FROM ALUMNI

Alyce W. Jewett: Historical Figure

Alyce W. Jewett, now 80 years old, resides in McArthur, California. She remains active in judging dairy shows, as she has been for six decades. Alyce Jewett was an animal husbandry student at UCD from 1927-1930, became the first UCD woman instructor "in any but English classes" from 1934-1936, and was Public Affairs Officer for Chancellor Emil Mrak from 1960-1962. These are her own words recounting a little of her colorful past:

During high school years, I lived in Rockridge and rode horseback each afternoon in Berkeley (English style). I attended high school in Berkeley—Miss Head's (now Head-Royce, Oakland), the oldest private school in East Bay. I had never lived on a farm, had already been admitted to Wellesley, when I persuaded my very urban-minded father that I wanted to attend Davis and major in animal husbandry! He lived to feel that it was not a mistake.

In autumn, 1928, as a member of the general livestock judging team, I participated in the annual livestock judging contest, Pacific International Livestock Exposition, Portland, Oregon in which college teams competed. I was high individual in that contest, tying for the highest score ever made (in placings and oral reasons) in its history.

On the day that the results were announced, I was invited to attend an annual Rotary Club luncheon at which some 300 men were present. I was seated at the head table beside Mr. J. C. Penney. When my winning score (946 out of a possible 1,000) was announced, I received a standing ovation.

For two decades, I was the only woman judging dairy cattle in the U.S.—judging ten or more fairs annually in northern and central California (on vacation days, weekends or on days of leave without pay).

Certainly the crowning event for me on UCD campus—or anywhere—was on April 4, 1962. The Chancellor wisely decided to schedule a very special event for the 100th birthday of Judge Peter J. Shields who wrote (and vigorously supported) the bill that created the University Farm, Davis, which became the UC College of Agriculture and UCD. (He was Judge, Superior Court, Sacramento for 50 years.) He had no child of his own, had known my mother long before I was born, always called me "my Alyce". In his hundredth year, he was homebound but ambulatory, immaculately dressed, blind and almost totally deaf.

When I conveyed to him the Chancellor's desire to honor him, I asked him to designate the speaker and writer, since it would be published. His firm reply, "Only you, my Alyce; only you," emphatically, despite his frail condition.

Present on stage that day were Chief Justice Earl Warren, Governor Edmund G. Brown, UC President Clark Kerr, and Chancellor Mrak. April 4, 1962 was the peak day of my life.

Alyce Williams Jewett

Alumni are invited to write letters for publication in the newsletter. Mail to: Tales and Trails editor, Animal Science Department, 2223 Meyer Hall, University of California, Davis, CA 95616.

Hart Hall Remodeling

Central campus' antiquated, but well-loved, Hart Hall will be structurally transfigured, with "every effort made to preserve the historical features" of the edifice, according to a memo from the UCD Office of Architects and Engineers. The main entrance lobby, the roof lines, the south and east facades and front landscaping of the former Animal Science building will remain much as before.

Radical changes include redoing mechanical and electrical systems and adding air-conditioning. Due to seismic and fire concerns, the wooden roof structure will be replaced. New roofing tiles, identical to the original ones, will be purchased from the initial manufacturer who is still in business. Portions of the building's wings will be gutted and expanded to open onto a landscaped courtyard and bicycle parking area where the vehicle parking lot once was. It is expected that renovations beginning March 26, 1990 will take 16 months to complete.



Back view of Hart Hall where recent demolition is most evident.

PCDAIRY: Computer Programs for Dairy Cattle Ration Formulation and Analysis

PCDAIRY, a package of seven computer programs for formulating or analyzing rations for dairy cattle, was designed and programmed by Animal Science Cooperative Extension Specialist Don Bath and programmer Suzanne Strasser. A primary benefit of these programs is their ability to cost-analyze and advise the user of least expensive feed rations while meeting optimum nutritional needs.

To formulate a ration, the user specifies the type of animal, desired milk yield and/or weight gain, feed ingredients available, and current price of each feed. PCDAIRY then calculates the NRC nutrient requirements for the ration based upon the input data. Available feed ingredients for the ration may be selected from a standard feed library database supplied with the program. Ingredients not included in the library may be entered into the program by the user. Through the various programs, the computer will determine a ration, provide information as to ration composition with a complete nutritional analysis of the ration, and give price ranges for feeds used in the ration and prices for feeds not selected.

IBM-compatible personal computers with 512K of memory can run the seven different PCDAIRY programs. The programs incorporate state of the art microcomputer software, including full-screen editing for input, pop-up help message windows, pop-up multiple choice list windows, and extensive error review. Nutrient requirements and feed composition data from the National Research Council (NRC) Bulletin, 1989, are used in the programs.

Interested parties should contact Cooperative Extension Specialist Don Bath or programmer Suzanne Strasser in the Animal Science department for more information.

George Bath Remembered

Retired Sonoma County Farm Advisor, George Bath, father of Animal Science extension specialist, Don Bath, died at age 86. He was a graduate of UCD in animal husbandry in 1927. During his long and respected career he also served as Farm Advisor in Kings County, managed a

poultry ranch in Santa Rosa, and worked as an agricultural appraiser for the Bank of America. He was Livestock Farm Advisor and Sonoma County Director for the University of California Agricultural Extension Service from 1950 until his retirement in 1967.

George Bath has been described as "an agrarian missionary and rural sociologist rolled into one." His funeral was attended by hundreds of farmers and friends who remembered his frequent visits to their farms and ranches where he translated the university's latest research information into ideas they could use.

Reuben Albaugh Receives Two More Awards

Emeritus Cooperative Extension Specialist Reuben Albaugh was presented with the UC Davis College of Agriculture and Environmental Sciences' Award of Distinction for his leading role in the development of California's livestock industry. The California Beef Cattle Improvement Association (CBCIA) dedicated its statewide symposium "COW-ference" to Albaugh and awarded him with their High Horizon Award. Reuben Albaugh has more than 60 years of service with Cooperative Extension.

On June 1, 1927, Albaugh joined Cooperative Extension as Assistant Farm Advisor for Monterey County. He organized the Monterey County Cow Testing Association in 1928, an association of dairymen that provided for monthly testing of dairy cows to determine levels of butterfat. In 1935 Albaugh helped to organize the Monterey County Cattlemen's Association, now one of the leading beef cattle associations in California. During World War II he worked with Animal Science Department Chairman George Hart who was also chairman of the Feed Committee of the War Board. Together they were able to secure grazing rights on Fort Ord, Hunter-Leggett and Camp Roberts military reservations. Albaugh also cooperated with the U.S. War Department on the remount stallion program, designed to improve the light horses of the United States for future military purposes.

In 1949 Albaugh was appointed Extension Animal Scientist at UC Davis where his list of accomplishments became endless. He received some 20 awards, has been a member of at least a dozen professional and community organizations, participated in stock judging activities, has written technical and semi-technical publications and over 600 popular articles regarding improved practices in agriculture. He has authored four books, including "Tall in the Saddle," "Horses and Men," "Cattle, Country and Champions," and his memoirs "College Cowboy" and co-authored two books "Beef Cattle Production" and "Ranching Traditions." At age 88, Reuben Albaugh is still active making presentations and writing articles.

Dr. Touchberry Visits Armenia

A team of agricultural and veterinary specialists from U.C. Davis joined Armenian veterinarian and UCD graduate Arthur Hazarabedian in a visit to his homeland, Armenia, a republic of 3.5 million people in the southwestern part of the Soviet Union. Armenia is still recovering and rebuilding from the devastating December, 1988 earthquake that killed tens of thousands of people and destroyed approximately one-third of that country's cattle. While the team was in Armenia, the Azerbaijanis established a blockade against Armenia and prevented railway shipment of food and supplies from other Soviet republics to Armenia. This led to violent incidents on the border and the intervention by Soviet troops three weeks after the UCD team left Armenia.

Animal Science Professor R. W. Touchberry, one of the UCD visitors, reflected on his trip to Armenia. He noted a great similarity of organization and operation of farms, and of farm building design in Armenia and other Soviet republics he had visited in 1974. Dr. Touchberry and a number of animal scientists spent seven weeks visiting research labs and farms near Moscow, Leningrad, Riga (Latvia), Kiev, Kharkov, Poltava and Tashkent. Despite climate variations, the same plans for farm buildings had been used in Armenia as in Latvia and Tashkent fifteen years ago and they were outdated then. As Armenia is rebuilding after the earthquake, the obsolete plans are again being used.

Dr. Touchberry also observed: "Feeds, especially forage, were of low quality and lacked the nutrient content of good silage or hay because most plants were harvested too late and were stemmy. Breeding and genetic programs are essentially non-existent; there is no routine testing of milk and recording of production, thus no selective breeding despite laboratory capabilities. Libraries are inadequate and out-of-date. Most Armenians do not speak or read English and cannot read scientific literature published in English. Armenian laboratories and equipment were established in the 1950's under Kruschew's program and little equipment has been added since."

Dr. Touchberry noted that personal computers were scarce. "I saw one in a dairy processing plant that was used sparingly to help formulate mixture of milk powder and fresh skim milk."

The visitors met with farmers, officials and scientists and toured farms, processing plants and research in-

stitutes. After their two-week visit, the group is preparing a technical report recommending to Chancellor Hullar specific measures for establishing exchanges with scientists in Armenian agriculture. It is hoped further informational interactions between Armenia and the University will assist the Armenians agriculturally and provide research opportunities for UCD students and faculty members interested in studying a state or collective farm system.

Dr. Touchberry added, "The Armenians are well-educated and an industrious people who would like to have freedom to use their talents, abilities and originality. At the rate Armenia is changing, these farms may be under a private capitalistic system in a relatively short time."

Animal Science Visitors Come From Across the Globe

The Animal Science department is rich with international scholars bringing a diverse expertise from faraway academic institutions in China, Australia, Korea, Hungary, Argentina and the U.S.S.R.

Visiting veterinarian, Dr. Diego Ezcurra, from the La Primavera Embryo Transfer Center in Argentina, will be studying embryo transfer techniques with Animal Science's Dr. Gary Anderson. From the U.S.S.R, Professor Sagypash Sadiev of the Agricultural Institute of Celinograd is involved in ruminant nutrition and metabolism with Professor R. L. Baldwin of the Animal Science department. Dr. Sadiev's present research activities include animal genetic engineering: manipulation of genes coding for animal hormones, construction of vectors for heterologous gene expression in prokaryote systems, and the effects of recombinant hormones and their analogues in animal metabolism. Visiting Associate Professor Sandor Fekete of Budapest, Hungary has focused his research on body composition determinations in rabbits and is sponsored by Assistant Professor Dan Brown.

Assistant Professor Hongbin Li from the Aquatic Product College of Tianjin Agricultural College in the Peoples Republic of China is doing research in the area of triploid grass carp with Animal Science Professor Serge Doroshov. Mr. Wei Lui is an Assistant Researcher from the Biological Resources Institute at Jiangxi in the Peoples Republic of China and is studying fish nutrition with Animal Science's Dr. Silas Hung. Dr. Trish Berger has sponsored Assistant Researcher Hongwu Zhang, also of China, who is doing research in reproductive physiology while visiting the department.

As participants in an exchange program, Education Abroad, Professor Rolf Beilharz from the University of Melbourne, Australia is taking the place of Animal Science Professor Edward Price who is on sabbatical leave in Australia. Besides being engaged in a research project with Dr. Price, Dr. Beilharz is teaching Animal Science 105, Behavior Adaptations of Domestic Animals, and has presented an interesting seminar, "Is reproduction limited by the environment; if true, what are the consequences of genetic change?"

Located near the Mexican border in southernmost California, at the Imperial Valley Field Station Associate Professor Richard Zinn has sponsored Dr. Man Kang Song, a researcher from the Republic of Korea who has a research interest in ruminant nutrition. Although not a foreign visitor, Professor Jack Van Horn from the University of Florida is observing dairy industry practices as they pertain to nutrition and waste management by working with Animal Science faculty and Cooperative Extension Specialist Don Bath. Dr. Van Horn presented a seminar, "Managing Dairy Manure."

Troy Nicolini: Student Who Lives in the UCD Horse Barn

Student resident staff such as Troy Nicolini oversee their assigned Animal Science facilities throughout the year, evenings and weekends, in exchange for housing within the barns. Caretaking duties differ from barn to barn, but generally include feeding the animals, observing them for injuries and diseases, controlling visitors, and ensuring that the animals are safely contained.

Troy makes his home in the Animal Science Horse Barn that furnishes him with a simple 10' x 10' bedroom with a bathroom. It is adequate, although without cooking facilities and air conditioning. An overhead loft of bedding straw insulates his room fairly well from temperature extremes. Through the wall just a few feet from Troy's bed, he can hear the whinnies of horses in their stalls within the barn at night. Over time, Troy has learned to determine the horses' actions by the sounds they make (much like parents knowing the sounds of their children). He says he tries to put the noisy horses on the far side of the barn so he can sleep better.

Troy reviews campus events for anticipated visitors to his area since crowds present an increased danger to the

animals, as well as to the visitors who may inadvertently "spook" the horses. For popular campus activities such as Horse Day and Picnic Day, Troy is actively patrolling and checking the facility. On ordinary weekends when no activities are scheduled, he receives several carloads of drop-in students and families, most of whom have little experience around horses. Troy answers their questions and tries to teach them a few horse-handling pointers. He frequently walks the perimeters to make sure that people stay out of the pens, that the gates are kept closed and the horses are in their corrals. Additional gates were installed recently at his suggestion, these adding an extra enclosure outside the fenced pens in case a horse should break loose while a pen gate is open.

Troy observes the horses for symptoms of illnesses, which left unnoticed, could be fatal. Sometimes horses become trapped while lying down (called "casting"), particularly if they get too close to a feeder or fence, and Troy has to free their legs or turn them with a rope so they can get up. Once, after feeding mixed formula to an orphaned foal, it trailed after him as he worked, even following him into his room (and it had been fed from a bucket, rather than a bottle).

Troy has included agricultural engineering in his curriculum. He applies his experiences with horses to his studies in the design of animal enclosures as well as to research in ground seepage and drainage where animals are raised near agricultural crops.

The Animal Science student resident staff reside in six department barns: the dairy, beef, horse, sheep, and hog barns and the feedlot. Their services are critical to the successful management of departmental livestock.



Orphaned foal checking Troy Nicolini's desk drawer at the Horse Barn.

Picnic Day Events Show Diversity

by Duff Devine, Picnic Day Committee Chairman

The theme for the 77th Picnic Day Celebration was "Shaping Our Environment with Diversity, Tradition, and Style." Visitors not only had an opportunity to tour campus facilities such as the new Shields Library addition and the Silo II building, they also were treated to a diverse assortment of events and exhibits. Among the most popular attractions of the day were the fistulated cow and the petting zoo; both were presented by Block and Bridle Club. The dachshund races, rodeo, sheep dog trials and frisbee dog competition were also major attractions.

The H.H. Cole facility was the main focus for departmental displays. In addition to the fistulated cow and petting zoo exhibits, Block and Bridle members and other students worked hard to present the Little International Livestock Showmanship Contest which included classes of beef, dairy, sheep, swine, goats and horses. The students also hosted several educational displays which ranged from the topics of animal nutrition to genetics. Other events at the Cole facility were a horse breeding demonstration offered by Dr. Jan Roser and a horse shoeing demonstration presented by Kirk Adkins from the School of Veterinary Medicine.

At Meyer Hall, Professors Adams, Doroshov and Oberbauer gave "mini-lectures" on the following topics in Animal Agriculture (respectively): contraceptive vaccines as an alternative to castration, culture of sturgeon, and spider lamb syndrome. There were also several demonstrations on the use of computers in animal agriculture. Steven Berry, Abbas Ahmadi and Suzanne Strasser explained the latest agricultural extension software and Dr. James Fadel demonstrated several uses of computers in teaching and research.

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Tales and Trails

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