

First Angus Family in Space



**SPECIAL REPORT BY
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When the Space Shuttle Endeavour carries Astronauts Mark Lee and Jan Davis into Earth orbit late this summer it will establish at least two firsts:

Mark and Jan will be the first husband and wife ever to fly in space together, as well as the first Angus breeder family to orbit the Earth.

It wasn't planned that way. Dr. Jan Davis and Lt. Colonel Mark Lee were married after they were assigned to the mission. In fact, the wedding almost caused them to be taken off the flight. But fortunately NASA officials changed their minds at the last minute. It is not likely, however, that the two will ever again fly together on a Space Shuttle mission, or any other married couple.

The official launch date for the Space

Shuttle that will carry the Spacelab J joint scientific space venture between the United States and Japan is September 11. And no, it won't carry the first registered Angus breeder in space.

Lee already established that mark in 1989. He was a member of the crew on the four-day mission aboard Space Shuttle Atlantis to deploy the Magellan spacecraft. Magellan studied the planet Venus and mapped its cloud covered surface with radar. Lee, many Angus breeders will remember, was guest speaker at the 1989 National Junior Angus Heifer Show in Louisville, Ky., where he treated exhibitors and their parents to films of his first space flight.

Davis will be on her first space flight. She finished her training and joined the NASA astronaut corps in 1988. She was born November 1, 1953 in Cocoa Beach, Fla., but grew up in

Huntsville, Ala., home of the Marshall Space Flight Center, where she developed an early interest in space flight.

Davis earned a bachelor of science degree in applied biology from the Georgia Institute of Technology in 1975, a bachelor of science degree in mechanical engineering from Auburn University in 1977, and a master of science and doctorate in mechanical engineering from the University of Alabama in Huntsville in 1983 and 1985, respectively.

After earning her doctorate, Davis went to work at the Marshall Space Flight Center. Some of the projects she worked on while there were the Hubble Space Telescope, the advanced X-Ray Astrophysics Facility, and she was the lead engineer for the redesign of the Solid Rocket Booster external attachment ring.

Lee decided at an early age that he



NASA's space shuttle Endeavour will carry Angus breeders Mark Lee and Jan Davis into orbit this summer.

NASA PHOTO

wanted to raise Angus cattle, but it took him a few years to realize this dream. First he had to become an astronaut.

He was born August 14 in Viroqua, Wis., and grew up on the mink farm owned by his parents, Charles and Ruth Lee. After high school he was accepted into the U.S. Air Force Academy where he earned a degree in civil engineering in 1974. In 1980 he received a master of science degree from the Massachusetts Institute of Technology.

Lee flew both F-4 and F-16 fighter airplanes and served in command positions at Hill Air Force Base in Utah. In 1984 he was selected as an astronaut candidate.

"When I was growing up I envied our neighbor who had Angus cattle grazing in a pasture next to our farm," Lee says. "It seemed to me that Angus required a lot less labor than minks."

It wasn't until four years ago, however, that he bought his first registered Angus cattle from John Anderson at Verona, Wis., and joined the American Angus Association. Today he has 15 cows, which this spring had a 100 percent calf crop with eight heifers. The heifers will help with his plans for herd expansion.

"I will always have a small operation, probably 30 cows or so at the most," Lee says. But he looks forward to the time when he can become more involved in the registered Angus business, and the American Angus Association. Their farm, called Astro Angus Farm, consists of 700 acres and is near Viroqua. They have hay, pasture, some corn and a little CRP ground, and lots of trees.

"In the last few years I have planted 25,000 trees," Lee says. "I started planting trees soon after my first NASA mission when I saw what we are doing to the environment. I want to run an environmentally sound farm that includes a herd of registered Angus."

Delbert Turnmire looks after the herd and the farm when Lee and Davis are away. The farm almost surrounds the Turnmire home. What's more, the Turnmire children are also involved in Angus projects. "It is a good deal for all of us," Lee says.

Davis had little experience with farming and cattle raising until she married Lee. Her grandfather was a farmer and also editor of a Texas farm publication, so it is not a foreign world to her.

Lee jokes that her interest in Angus cattle was sparked when she read in the *Angus Journal* that actor Mel Gibson is a rancher and in the registered Angus business.

The couple go to Wisconsin as often as their schedules permit — usually 10 to 15 times a year. Lee times visits so that he can vaccinate and tattoo the cattle. He also builds fence, plants trees, and in general keeps his finger in everything that goes on at the farm. He also is a good carpenter and refinishes furniture.

Lee and Davis are Spacelab J crew as opposed to flight crew. Lee is the payload commander, a job he has had for some three years. It has been his responsibility to bring the Japanese space program on board. He has worked directly with the Japanese scientists who designed the experiments, and he is re-

sponsible for overseeing all the experiments during the flight. He has spent some six months in Japan in preparation for the joint scientific mission.

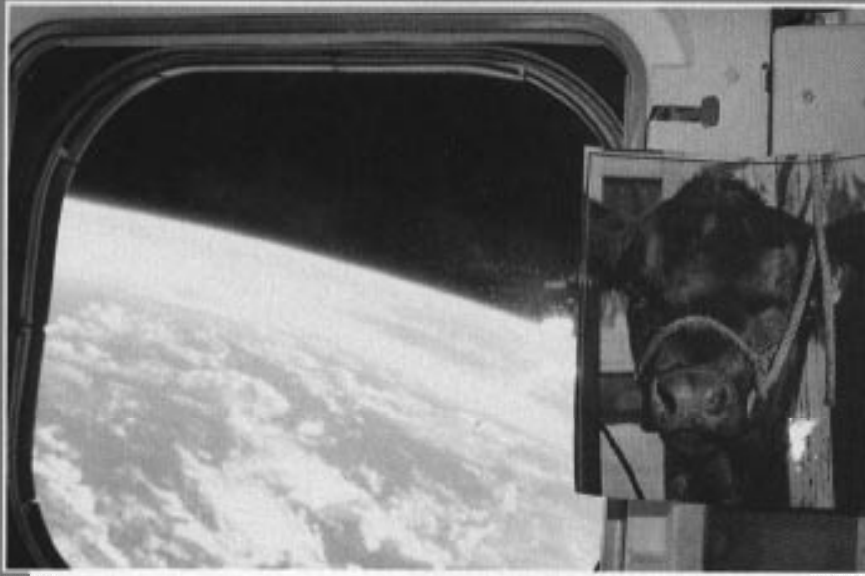
Davis is the second mission specialist. She will do material science and biological experiments on the blue shift. The crew is divided into red and blue shifts — one group sleeps while the other works. Davis and those on her shift are scheduled to sleep beginning about three hours into the mission. Up to four crew members can sleep at a time. There are no beds as such, it is more a matter of strapping yourself into position against a wall, behind a panel that provides some darkness. The straps keep the astronauts from floating around the cabin while asleep.

Davis has also been training for extra vehicular activity (EVA), or space walks as most of us call it. No space walks are planned, but if it is necessary to go outside the controlled environment of the shuttle and lab then it will be her responsibility. She will also operate the space arm if it is used.

The other two members of the Spacelab J crew will be Japanese scientist Dr. Namoru Mohri who was selected from a field of three scientists to join the crew of Spacelab J. The other two Japanese scientists also have trained for the mission and will serve as backups to Mohri in case he is forced to cancel.

The fourth member of the Spacelab J crew is Dr. Mae C. Jemison, M.D., a mission specialist. She completed her astronaut training in 1989 and is also making her first space flight.

This second flight of Endeavour with Spacelab J aboard will lack the drama



This photo was taken by Mark Lee out of the space shuttle window in 1989. The Angus is from the cover of the January 1989 Angus Journal.

of the maiden flight of the new shuttle in May 1992. It was during this mission when the whole world looked on via live television as three improvising, space walking astronauts grabbed a rotating, four-ton satellite by hand and attached a bar to it so that it could be brought into the Shuttle cargo bay.

The Spacelab J mission, though, may be more important for the future of space flight. It will help answer a number of questions about the feasibility of long space flights, and about manufacturing some products in space.

For example, frogs will help explain whether it may be possible to reproduce animal life in weightlessness. This could be important to very long space flights. It may be that gravity plays an important part in embryo development during and just after fertilization.

To help test this theory, female frogs in Spacelab J will be induced to ovulate and shed eggs. Half these will be fertilized in microgravity and the other half will be fertilized in a centrifuge that is spinning to simulate normal gravity. Some eggs will be taken out and fixed at various stages of development for study later. The remainder will be brought back to Earth and allowed to develop into frogs after the mission.

Scientists suspect that gravity sensitive structures, such as the inner ear will develop differently in weightlessness.

Another experiment will look at the growth of carrot cells to find out if and how gravity affects plant development. Fruit flies, in still another experiment, will be exposed to cosmic radiation in different areas of the lab and shuttle.

If the radiation causes mutations in the flies it will be easy to spot. In this

species of fruit fly mutation inducing radiation causes cells on the flies' wings to produce more than one hair.

In another experiment, fertilized chicken eggs in various stages of incubation will be used to study bone formation. Previous studies of astronauts indicate that bone is not formed normally during space flight.

The eggs will be checked at various stages and some will be allowed to continue to develop after the flight is terminated. All will be compared with a test group of similar eggs that will remain on earth.

The results could not only help astronauts, but people on Earth who are subjected to long periods of bed rest.

The scientific mission is truly international. Some of the hardware was built by the European Space Agency. The materials and life sciences investigations were designed and will be conducted by NASA scientists and scientists working for the National Space Development Agency of Japan. In all, there will be 44 experiments conducted during the seven days.

In addition to the biological experiments, the materials science experiments will examine new products, new or improved production methods and the suitability of microgravity for certain processes.

Space flight has become almost commonplace over the past few years. But this flight, at least for Angus breeders, will be far from commonplace. On board will be a member of the American Angus Association and his wife, who is also fast developing an interest in farming and Angus cattle — call them the first Angus family in space.

Is There Gravity in Space?

True weightlessness occurs in deep space where a spacecraft does not experience a gravitational pull. This is not the case 200 miles or so above the Earth where the Space Shuttle Endeavour and its cargo, Spacelab J, will orbit.

In fact, if it were possible to build a 200-mile high tower on Earth reaching to the elevation of the Shuttle orbit, a rock dropped from the top of that tower would plunge straight to Earth at virtually the same speed and with the same acceleration as one dropped from a tall building. Gravity is nearly as strong 200 miles in space as it is here on Earth.

So why can astronauts in the Shuttle float around the cabin as if there were no gravity? This weightless or microgravity situation aboard orbiting spacecraft is created because the Shuttle is literally "falling" around the Earth. Since it is in freefall the effects of gravity are virtually eliminated.

The Shuttle is kept from being pulled to earth by the speed at which it is placed into orbit. The centrifugal force of the Shuttle equals the gravitational pull of Earth.

An astronaut working inside or outside the Shuttle is falling at the same speed and in the same orbit as the Shuttle, so he or she does not drop back to Earth either.

This "falling around Earth feels the same as being in deep space. So even though the Earth's gravitational pull is strong in the Shuttle orbit, the freefall of the Shuttle allows the Spacelab crew to live and conduct experiments in microgravity just as if they were in deep space on a mission to Mars or beyond.