

FRONTIERS OF PIGDOM

BREEDERS CREATE A LINE OF VERY SMALL PIGS FOR LABORATORY USE

By JULIE ANN MILLER

Once upon a time, about 10 years ago, there was a pig named Martha. She was a pleasant pig. She was a healthy pig. But she was a very small pig. Today, Martha's great-great-grandchildren are rooting out a role for themselves in medical research.

Martha's descendants, called micropigs, are slightly larger than beagles. At maturity they weigh 50 to 70 pounds, rather than the 600 to 800 pounds of common farm pigs. Gray and hairless, the micropigs are clean and easy to handle, according to Linda Panepinto, the director of the miniature-swine research laboratory at Colorado State University in Ft. Collins. "This could well be the laboratory animal of the future," Panepinto says.

Pigs are useful in medical research for several reasons. They will eat anything that people eat (and they have a real sweet tooth), so they can be used as a model for human disorders linked to nutrition. In addition, pigs have striking physiologic and metabolic similarities to humans. The porcine and human cardiovascular systems, stomachs, teeth and skins are very similar, Panepinto says. Pigs also have a natural tendency to develop such diseases as ulcers, atherosclerotic lesions and sometimes diabetes.

The micropigs are the second stage in the development of miniature pigs. Since 1973, the Colorado laboratory has maintained a colony of a naturally occurring breed of small pigs from southern Mexico and Central America. Called Yucatan miniature pigs, or minipigs, these ani-



mals weigh 150 to 200 pounds as adults and have been widely used in medical research.

"But I felt there was a real need to miniaturize the breed further," Panepinto says. "When a little pig named Martha had a normal birthweight but stopped growing at about 65 pounds, I had a strong feeling that genetic factors were involved. So I proposed a research program based on genetic selection for exceptionally small pigs."

Now, one decade and four pig generations later, Panepinto has a colony of 100 pigs, each about the



size of Martha. The breeding program was more complex than simply crossing the smallest pigs, because the researchers tried to make the micropigs as genetically heterogeneous as possible to avoid inbreeding problems. "We have not seen any indication of metabolic abnormalities," Panepinto says.

A commercial supplier of laboratory animals, Charles River Breeding Laboratories of Wilmington, Mass., has collaborated with the Colorado group and is maintaining a colony of micropigs to sell to scientists. Researchers at several universities and pharmaceutical companies are already using micropigs, according to Panepinto. "There has been so much interest in the micropigs that I have been traveling all over the country giving talks about them," Panepinto says.

The micropigs, having cloven hooves,

Panepinto poses with a Yucatan miniature pig, the forerunner of the micropig.



A large (100-pound) pregnant micropig with Kit Sutherland of CSU.

must be kept in a facility with special livestock flooring or with a smooth floor deeply covered with pine shavings. Three or four micropigs can share a pen approximately 4 feet by 12 feet. Each eats about 1 pound of feed per day, compared with 2 to 3 pounds for miniature pigs and

Comfortable in the sling Panepinto designed, a micropig calmly submits to medical tests. A single researcher can coax the pig into the sling, and hoist the sling with a boat winch.

5 pounds for farm pigs.

Panepinto and her colleagues are developing laboratory methods for working with micropigs. "We put a high priority on animal comfort and proper handling," she says. For example, she has invented a special sling for lifting and temporarily restraining minipigs and micropigs. The sling allows the pig to rest belly-down on a soft pad while its legs hang through the openings. A boat winch is used to lift the animal and sling. The pig remains calm in the sling for as long as six hours. Panepinto says, "Sometimes they'll fall asleep because they are so comfortable."

"We're trying to get away from things like 'hog tying,'" she adds. "We want the pigs treated like lab animals, not like farm animals."

She believes that eventually it will be possible to create a breed of even smaller pigs. "A pig of 40 to 50 pounds maximum is now our goal." □