

# The Agricultural Research Complex

*New facility focuses on livestock industry needs*

*By Susan McGinley*

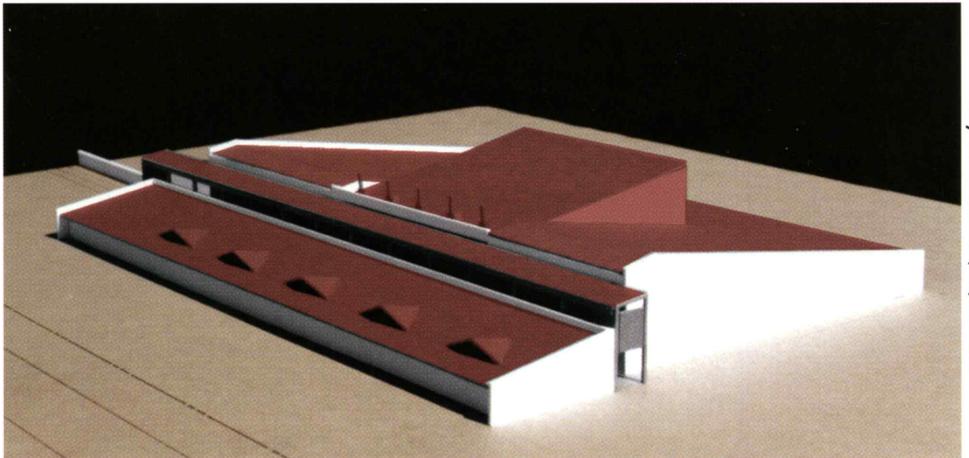
Arizona's high heat and blazing sunlight drive down milk and meat production in livestock, stressing the animals and the ranchers who raise them. Cattle and other farm animals respond to the heat by reducing feed intake, increasing their respiration rate and by increasing their body temperature. These responses assist the animal in cooling itself, but this is usually not sufficient. The hotter they are, the more they begin to shut down body processes not vital to their survival — milk production, reproduction, or building more muscle (meat). Livestock producers cannot afford to ignore the effects of high temperatures on their herds.

For decades, researchers in the UA College of Agriculture and Life Sciences (CALs) have studied the effects of heat stress on domestic livestock to help solve problems faced by the dairy, beef and other livestock industries operating in Arizona. They have examined mechanical cooling systems — fans, spray mists, shaded overhangs — and have made recommendations. Yet the scientists could never be sure these measures actually reduced the animal's physiological stress until now.

A new facility completed in spring 2002 at the Campus Agricultural Center in Tucson will allow scientists to study those deeper metabolic and genetic mechanisms. Known as the Agricultural Research Complex, it is dedicated to researching the environmental factors that affect the production capacity of farm animals. Partial funding was provided by a facilities grant from the USDA Cooperative State Research, Extension and Education Service.

"This facility is viewed as state-of-the-art by animal physiologists around the country," says Colin Kaltenbach, director of the Agricultural Experiment Station at the University of Arizona. "It will allow our researchers to be more competitive for federal grants and provide a means of collecting specific information that would be otherwise unobtainable. It will allow us to be in the forefront of the science in this area."

The 40,000-square-foot multipurpose building features highly advanced environmental controls for light, temperature,



*Architectural model of the research complex.*

humidity and other factors that will allow faculty to conduct integrated studies in physiology, biochemistry, nutrition and molecular biology. The complex includes two rooms equipped with full-spectrum solar lighting that simulates almost exactly the intensity and radiance of sunlight. The building also features surgical facilities for treating sick and injured livestock, holding areas for livestock, and offices and meeting areas for faculty and students.

"This is a unique facility not duplicated anywhere in the world for doing stress studies on large animals," says Robert Collier, head of the Department of Animal Sciences and one of the scientists who will be working in the ARC. "It's unique because it has the solar array system, combined with very precise temperature and humidity control." This controlled environment will allow for a variety of studies on the metabolism of domestic animals, the effects of photoperiod or day length on production, and the effects of the environment on gene function.

The ARC is an integral part of the teaching, research, and service activities provided by the Department of Animal Sciences and CALs. Faculty and students from animal sciences, veterinary science and microbiology, natural resources and even the medical center are interested in conducting research at the facility.

Wildlife studies are also planned. Collier notes that natural history researchers intend to bring in bighorn sheep and antelope to look at their water require-

ments. Animals will not be placed in conditions more stressful than those they actually experience in Arizona's outdoor climate, according to Collier. The current focus is on cattle, sheep, horses, goats and pigs, with occasional studies on wildlife and on exotic domestic species such as ostrich and emu.

For all of these studies, the goal is to identify the physiological processes associated with heat tolerance and later develop new animal management programs to limit the effects of heat on animal well-being and productivity.

"Our main intent is to gain a basic understanding of animal physiology as it responds to changes in a thermal environment," Collier says. "For example, it's well-known that milk production in dairy cattle is reduced in summer months. We want to research more of the animal's internal responses to the heat." With less heat stress, the animals will produce better year-round. "Our ultimate goal is to understand the genes that control animal response to stress and be able to adjust gene function so animals can better adapt to various environmental conditions." These research results will apply not only to Arizona, but also to animal production in other hot, arid environments around the world. ☼

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