Research Briefs

Compounds may help produce juicier meat

Getting a juicy cut of meat isn't always the easiest of tasks. Juiciness is governed by how much marbling is woven within the muscles. The likelihood of getting a juicy steak or chop may increase in the future, thanks to Agricultural Research Service (ARS) scientists who are studying a class of compounds that increase marbling fat in livestock.

ARS physiologist Gary Hausman and his colleagues at the Animal Physiology Research Unit in Athens, Ga., in collaboration with University of Georgia researchers, developed a method that can increase marbling fat by as much as 3.5% by adding the compound as a feed supplement for swine.

Increased marbling fat improves meat quality factors such as flavor intensity, juiciness and texture. Decreasing fat in meats has been a goal of breeders in the past, but it results in meat that is not considered desirable by consumers.

Some of the compounds, called thiazolidinediones, are currently approved by the Food and Drug Administration (FDA) for use by diabetics to control glucose levels. However, none are currently approved by FDA for use in livestock with the intent of changing food composition.

In research studies, the compounds were mixed into livestock feed with relative ease. Most of the research focused on swine, but the compounds may also improve marbling fat in beef cattle.

Enhanced marbling fat would increase carcass value, benefiting the livestock industry and possibly providing increased profitability for producers.

Other technologies exist for boosting marbling fat, but they are costly and the effectiveness varies. A patent for the new technology has been filed, and foreign licensing rights are available.

Editor's Note: *This article was written by Sharon Durham of the ARS News Service, which provided this article.*

Evaluating effectiveness of riparian buffers

A specially designed field chamber has proven to be a good tool when used with a computer model to evaluate how effectively riparian buffers filter out pollutants before they can reach streams or other bodies of water. That is the finding from a series of systematic studies of a riparian grass buffer zone by scientists at the ARS Henry A. Wallace Beltsville Agricultural Research Center (BARC), Beltsville, Md.

After success with a prototype chamber in the laboratory, BARC soil scientists Jim Starr, Ali Sadeghi and Yakov Pachepsky installed a field version of the chamber in a tall fescue grass buffer near a forested stream and wetland area. The chamber has no top or bottom and encases the four sides of a 3-foot (ft.) by 3-ft. block of soil down to 4 ft.

The scientists injected water with dissolved nitrate into one side of the soil chamber. Then, as water flowed horizontally and out the other side, they monitored rates of lateral water flow and loss of nitrate due to its breakdown by soil microbes.

Riparian buffers are wooded or grassy streambanks or wetlands that filter out pollutants, such as nitrate from fertilizer and other chemicals, as well as sediment. The slow movement

of nitrate through highly organic riparian areas provides ideal conditions for soil microbes to break down or transform the nitrate into safer compounds.

The scientists used the two-dimensional computer model "Hydrus-2D" to simulate water flow and transport of chemicals within the riparian zone soil. Overall, the model-chamber combination provided good results.

The experimental chamber is essential for the accurate use of the growing number of computer models being developed to assess the effectiveness of riparian buffers. Once a model gets this information for a particular location, it can predict nitrate loss rates.

A paper on this study was to appear in the November-December issue of the *Soil Science Society of America Journal*.

Editor's Note: *This article was written by Don Comis of the ARS News Service, which provided this article.*

Florida cattle may reveal genetic keys to heat stress

Livestock producers will tell you that heat stress during hot Missouri summers takes a toll on herds and cuts into profits due to reduced animal performance.

University of Missouri (MU) researchers, with the help of 16 bovine visitors from Florida, are looking for key genetic markers for heat tolerance in cattle. The visitors are eight Angus and eight Romosinuano cattle raised at the same subtropical agricultural research station in Brooksville, Fla. Romosinuano is a Central and South American breed known to display heat tolerance.

"Our goal is to identify genetic markers that can predict growth, performance and health during heat stress," said Don Spiers, associate professor of animal science. "Ultimately, such markers would allow for the development of animal breeds that are more tolerant of heat stress without loss of performance."

The animals will be housed in environmental chambers where carefully monitored conditions approximate a typical Missouri summer month. Observations will include feed intake, respiration and sweat rates.

Blood samples will be taken, along with biopsies of blood, skin, muscle and liver, said Eric Antoniou, MU assistant professor and geneticist, who plans to study up to 18,000 genes that may relate to heat tolerance.

Genomic tools for such an in-depth study of these breeds have been developed at MU to identify markers of tolerance to long-term heat stress conditions, Antoniou said. The idea behind the research is not to artificially change the genetic makeup of the animals, but rather to discover natural gene variation in the two existing breeds that can be bred into a population, he said.

"For example, we know from earlier research that the Romosinuano cattle have a greater sweat rate than Angus. So one of the things we will be looking for is how gene variation affects sweating rates," Antoniou said.

Thermal heat stress is a major environmental contributor to poor health throughout the world. Although there have been numerous studies to determine acute response, few long-term examinations of its effects have been conducted, Spiers said. Likewise, success has been limited in identifying reliable markers of sensitivity that serve as early warnings of potential distress.

"We need a greater understanding of animal adaptation to the environment and the complex, long-term interactions that affect health," Spiers said. "This can be done only by studying animal species that contain both heat-sensitive and heat-tolerant animals."

There are no available populations of heat-resistant mice, rats or primates available for such research, he said.

Editor's Note: *This article was written by Robert Thomas of the University of Missouri Extension, which provided this article.*