

RESEARCH ROUNDUP

Cutting-edge solutions for today's challenges

Compiled by Shauna Hermel, editor

Clover offers antimicrobial properties

Researchers within the Agricultural Research Service's (ARS) Forage-Animal Production Research Unit have found another reason to love clover.

As natural nitrogen (N) fixers, clovers help instill nitrogen in soil and lessen reliance on chemical fertilizers. Common varieties, like red or white clover, are extremely palatable and can provide high-quality protein to cattle at a low cost.

According to microbiologist Michael Flythe, who worked with plant physiologist Isabelle Kagan and animal scientist Brittany Harlow to investigate potential plant-based antimicrobials, clovers are also an ideal alternative to synthetic bactericides used in cattle feed. They discovered that clover could effectively reduce hyper-ammonia-producing bacteria that live in the cattle rumen.

"Hyper-ammonia-producing bacteria decrease the amount of dietary protein that an animal can absorb through digestion," says Flythe. "Decreased dietary protein causes loss in cattle growth and overall performance. When you add clover to cattle diets, special compounds in clover called isoflavones actually improve the quality and quantity of protein available to the animals."

The magic of clover isoflavones, which are similar to estrogen in structure, doesn't stop there. Isoflavones give cattle an additional defense against dangers like fescue toxicosis. Caused by the consumption of endophyte-infested tall fescue, fescue toxicosis is a condition that results in tightened blood vessels, fertility problems,

weight loss and lowered milk production in livestock. It is estimated that fescue toxicosis costs the U.S. livestock industry \$2 billion annually.

"One of the reasons that common tall fescue is so abundant and resilient is actually because it contains a natural chemical defense against herbivores, which acts as a toxin when ingested," Flythe explains. "After it builds up in the cattle, the animals become ill because their blood vessels have constricted, impeding blood flow. But when cattle consume tall fescue with clover, the isoflavones open up their blood vessels and improve blood flow."

Research indicates isoflavones in clover can dilate arteries and promote healthy blood flow in humans, as well. Clovers and their extracts have been used to treat migraines, increasing their potential as a natural remedy for other vasoconstrictive conditions.

— adapted from article by Georgia Jiang,
ARS Office of Communications

Consumers still favor beef as protein source

Consumers who prefer beef over plant-based protein alternatives said they are willing to pay nearly \$2 more per meal for a burger when dining at a restaurant, according to a study from Kansas State University (K-State).

The same study notes that those who have turned to plant-based protein alternatives are equally passionate about their choice, saying they would be willing to pay \$1.48 more per meal.

Those are among the key findings released by K-State agricultural economists Glynn Tonsor and Ted Schroeder in the study "Impact of New Plant-Based Protein Alternatives on U.S. Beef Demand." The study was co-authored by Jayson Lusk, a distinguished professor of agricultural economics at Purdue University.

"Beef has what we call a good image, and we document it as a good image throughout the report," Tonsor says. "We've looked at a litany of questions, such as how does beef compare to plant-based proteins on a lot of dimensions, such as taste, safety, price, nutritional content, protein, iron, and even on whether it's good for farmers, the planet and consumers."

The nationwide study involved more than 3,000 consumers who represented the population of the



Red clover (*Trifolium pratense*) hay field. Unlike supplements, isoflavones do not need to be extracted and concentrated to use; the natural isoflavone content in red clover hay is high enough to spur weight gain and alleviate fescue toxicosis in cattle.



In the United States, beef is consumed three times more often than plant-based proteins, report K-State researchers.

country. Nearly 70% of respondents identified themselves as regular meat consumers (those who regularly consume meat or food from animals), while the remainder identified with such alternative diets as vegan, vegetarian, flexitarian or other.

Tonsor says regular meat consumers reported being willing to pay \$1.87 more per meal for a beef burger in a restaurant. They also would pay up to \$0.29 more per pound for store-brand, 80% lean ground beef at the grocery store.

Those who prefer alternative diets would pay \$1.48 more per meal in a restaurant, and up to \$2.32 per pound more in the grocery store.

“There’s a big preference among regular meat consumers today for the beef burger, and there’s a strong preference among the alternative diet folks for those newly offered items,” Tonsor says.

Still, the number of consumers choosing beef over plant-based alternatives is clearly in favor of the beef industry. The report notes that beef is consumed in the United States three times more often than plant-based proteins.

Among the factors influencing consumers’ choices are they consider the taste, safety and price of beef to be more appealing.

“Those are key differentiation points we see in this study and have seen in several studies,” Tonsor says. “Taste and safety, in particular, are key drivers of U.S. beef demand.”

“The protein market is immensely competitive, both from existing and new products being introduced,” he adds. “At the same time, global protein demand is strong and growing. The U.S. beef industry produces a high-quality, tasty, safe, nutritious, healthy and affordable product in an increasingly sustainable way. Capitalizing on what the industry does well while continuously striving to do it better is the best advice we can provide to compete in the evolving global protein market.”

The full report, and an executive summary, is available online from the K-State Department of Agricultural Economics’ website, agmanager.info.

— adapted from article by Pat Melgares, K-State

Can improving soil health mitigate GHG in semi-arid region?

A combination of the semi-arid climate and scarcity of water challenges the sustainability of ag producers throughout West Texas. A slight deviation often determines how profitable a growing season or herd can be. The key is to use as little of the limited natural resources as possible while still improving production. That task is the focus of many ag research projects in the College of Agricultural Sciences & Natural Resources at Texas Tech University.

Lindsey Slaughter, an assistant professor of soil microbial ecology and biochemistry in the Department of Plant and Soil Science (PSS), leads a collaboration with researchers from Texas Tech and the USDA ARS to develop new management strategies for agricultural grasslands that can improve production and soil health, conserve natural resources and reduce greenhouse gas emissions (GHG).

The project is backed by a \$500,000 grant from the USDA’s National Institute of Food and Agriculture (NIFA) Cooperative State Research Education and Extension Service. Based on preliminary data, the group hopes to show, through greenhouse gas manipulation and field measurements, how nutrient and forage management controls how much enteric methane (CH₄) is absorbed by the soil while improving soil health.

“One of the ways our results will immediately help producers is by showing whether planting both perennial grasses, such as Old World bluestem, and nitrogen-adding legumes, namely alfalfa and sweet clover, helps the soil to absorb methane better than planting only grasses that need nitrogen fertilizer to be productive and may even produce methane rather than absorb it,” Slaughter says. “This will help us show producers how what they plant in perennial grasslands can not only save water and reverse soil degradation, but also help soil microbes that shrink their climate footprint and make sure these systems can stay profitable long-term.”

Learn more about this project in the *Angus Beef Bulletin EXTRA* article at <http://bit.ly/ABB-SoilHealth>.

— adapted from article by George Watson, Texas Tech