Beefing Up Environmental Sustainability

Efficient Hereford genetics can help producers reduce methane emissions.

by ***Macey Mueller***

Despite years of misleading information and conflated statistics, the U.S. beef industry has made tremendous strides in efficiency and sustainability. Driven by improvements in genetics, nutrition, health and management, U.S. beef production is well on its way to reducing its carbon footprint, and according to some researchers, could actually become part of the global climate change solution.

Cattle have been called the "ultimate upcyclers" — using land often unsuitable for cultivation and upgrading the protein found in human-inedible plants to a higher-value food product. Nutrient-dense beef production, though, does come at a cost. According to the United Nations Food and Agriculture Organization (FAO), the global beef lifecycle contributes 6% of the world's greenhouse gas (GHG) emissions.

American efficiency

For years, the U.S. livestock industry worked to lower its carbon footprint while increasing the amount of beef produced to meet the needs of a growing global population. In doing so, the U.S. created the most environmentally efficient beef production system in the world. Citing Environmental Protection Agency (EPA) and United States Department of Agriculture (USDA) data, Sara Place, Elanco Animal Health chief sustainability officer, says the U.S. cattle herd decreased 8% from 1997 to 2017, yet produced 3% more beef and lowered GHG emissions 2%.

Despite these dramatic improvements, global GHG statistics are often incorrectly used to describe U.S. beef production GHG emissions, creating confusion and misleading consumers. Place says, according to the FAO, U.S. beef production is responsible for less than 0.5% of the global beef industry's total GHG emissions. The global emission rate for all livestock — beef, dairy, pigs, chickens, etc. — is 14.5%, which is a number commonly (and incorrectly) used to describe the effect of the U.S. beef industry alone. On a domestic scale, U.S. EPA

inventories indicate beef production is responsible for just 2% of all U.S. emissions.

The U.S. beef industry also has one of the lowest GHG emissions intensities (used to measure the GHG emissions per pound of beef produced), which is 10 to 50 times lower than beef produced in other parts of the world. The greater efficiency in U.S. production systems results in more beef per animal. For example, FAO statistics indicate the U.S. produces around 18% of the world's beef with 8% of the world's cattle herd. Furthermore, according to USDA National Agricultural Statistics Service (NASS) data, it takes 36% fewer cattle to produce the same amount of beef today than it did in 1975.

It is sometimes argued that U.S. beef production uses too much feed which could be consumed by humans. But, that's not the case says Place. Grains account for approximately 11% of an animal's lifetime diet, and the other 89% consists largely of feed that is inedible to humans (forage and byproducts), according to a 2019 U.S. study she helped conduct. Meanwhile, over two times more high-quality protein is generated by feeding corn to cattle and making beef than if corn were consumed directly by humans.

Managing methane

In addition, now researchers suggest emissions of short-lived gases like methane should be viewed differently than long-lived gases like carbon dioxide. Although very potent, methane reacts differently in the atmosphere, and emissions do not affect atmospheric concentration and temperature change in the same way.

Carbon dioxide emitted from the burning of fossil fuels accumulates over time and can spend up to 1,000 years in the atmosphere. It behaves much like a bathtub with a running faucet but a very slow drain. In contrast, methane breaks down over a decade and returns to the atmosphere as carbon dioxide. There it will be reabsorbed by the plants cattle eat, causing them to belch methane. The process is part of the "biogenic carbon cycle."

While methane still contributes to warming during those 10 years, it will not add additional warming if emission sources remain constant — similar to a bathtub draining at the same rate it is being filled.

To better calculate methane's climate impact, researchers are suggesting the adoption of a new measurement tool called "Global Warming Potential Star" (GWP*). This tool considers the differences in how short-lived climate pollutants like methane and long-lived climate pollutants affect warming of the atmosphere.

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Jason Sawyer, a research scientist at the King Ranch Institute for Ranch Management, has evaluated the overall GHG footprint of the beef industry. He says more effective metrics are needed to better measure and describe the actual environmental impacts of beef production systems.

"Using a tool like GWP* would dramatically reduce the reported carbon dioxide equivalent estimate of U.S. beef production and really change the current narrative of beef's role in global temperature change," he says. "If we consider carbon uptake by grazing lands and use a rate-based metric like GWP*, U.S. beef production may already be climate neutral."

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Even as more information about methane's role in global temperature change continues to unfold, it is important to remember that lowering methane emissions should still remain a top priority for beef producers.

Hereford advantage

Dave Lalman, Ph.D., animal and food science professor at Oklahoma State University (OSU), says Hereford genetics can help play a role in increasing production efficiency, and therefore, lower GHG emission rates.

"Generally speaking, forage-based diets have a higher methane production per unit of feed digested compared to a high-concentrate diet, and unfortunately, that means the cow-calf segment is the largest contributor to beef production methane emissions," he says. "Anything we can do to reduce forage intake and still maintain productivity should help reduce methane production."

In a recent study, Lalman and his OSU research team compared Hereford-sired, black baldy females to straightbred black females and found baldy cows averaged a higher body condition score over straightbred cows while consuming less feed per day. On average the baldy female consumed roughly 2 pounds per day less of moderate- to low-quality forage than her straightbred counterpart, resulting in 725 pounds less forage in a year and an annual savings of $22-$50 per head, Lalman says.

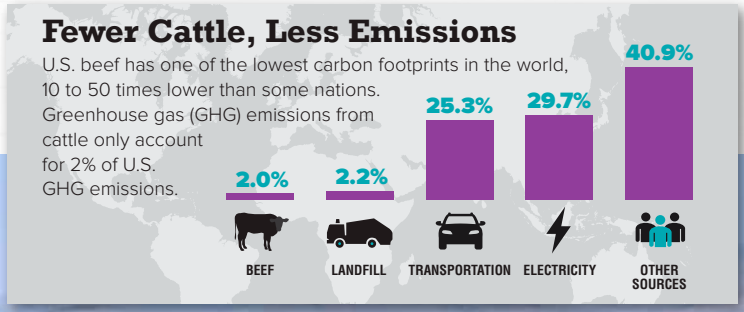
The study's results suggest Hereford genetics are complementary in a crossbreeding system with Angus cows to reduce the amount of feed resources needed for production and potentially increase the stocking rate overtime with crossbred animals that consume less feed.

"Most studies on crossbreeding impact on feed intake show that the heterosis in crossbred animals usually results in increased feed intake," he says. "But in our case, the heterosis effect was basically overpowered by the reduced feed intake and genetic influence of the Hereford cattle."

Lalman and his students are currently working on a study measuring beef cow voluntary forage consumption in relation to methane emissions.

The OSU preliminary data shows that a set of cows averaged 28 pounds of hay intake and produced 331 grams of methane per day. Importantly, for every 1-pound lower daily hay consumption, methane production was reduced by 9 grams.

"Using this information, a modest reduction in voluntary forage intake similar to the baldy study should result in about 18 grams or a 5% reduction in methane emissions," he says. "It's not a huge percentage, but it's definitely an improvement, and it's all of the little improvements we're able to make as an industry that collectively lower our methane emission rate." HW



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