U.S. Cattle Production Sustainability Overview

Greenhouse Gas Emissions Breakdown in the U.S.

According to the U.S. EPA's greenhouse gas (GHG) emissions inventory, ***2% of U.S. emissions come directly from beef cattle***[1] (methane from cattle belches, methane and nitrous oxide from manure). Total direct emissions from all agricultural production, crops and livestock collectively, were 8.4% of U.S. emissions in 2017. Agriculture, land use, land use change, and forestry combined in the United States are a net sink of CO_2 equivalent (CO_2e) emissions, meaning they removed 172 million metric tons of CO_2e from the atmosphere in 2017.

Table 1. 2017 U.S. Greenhouse Gas Emissions Sources and Sinks[1]

Item	Million metric tons CO_2e	% of US total GHG emissions
Beef cattle	138.3	2%
Other animal ag	117.5	2%
Crop agriculture	**286.3**	4%
Agriculture total	**542.1**	8%
Transportation	1800.6	28%
Electricity	1732	27%
All other human-caused GHG emissions	2382	37%
U.S. total GHG emissions	6456.7	100%
Land use, land use change, forestry	-714.1	
Agriculture, land use, land use change, forestry	-172	

What's the Global Situation Look Like

Large disparities in emissions intensities, or GHG emissions per lb of beef produced, exist across regions of the world. The U.S. has one of the lowest beef GHG emissions intensities: 10 – 50 times[2] lower than other parts of the world. Most of this variation is driven by the number of cattle required to produce beef. For example, the U.S. produces around 18% of the world's beef with 6% of the world's cattle herd.[3] Fewer cattle required for a given amount of beef produced means fewer GHG emissions and fewer natural resources required to produce human nourishment. The U.S. is a leader in beef production efficiency because of scientific advancements in beef cattle genetics, nutrition, husbandry practices, and biotechnologies.

Correcting the Misinformation

A quick Google search of beef and GHG emissions will result in a wide range of statistics. Unfortunately, two types of conflation typically occur that muddy the waters. First, globally-relevant statistics are often conflated with U.S. emissions, and second all emissions from livestock production are often ascribed to beef.

Globally, life cycle emissions from livestock production (emissions from feed production to consumer) are 14.5% of GHG emissions. ***Global beef life cycle emissions are 6% of the world's GHG emissions.***[4] The disparity between these two percentages is due to the other forms of livestock agriculture accounted for in the 14.5% figure, such as poultry, pork, and dairy production. In the United States, ***beef cattle production produces 3.7% of U.S. GHG emissions from a life cycle perspective***[5] (adding in feed production, fuel and electricity use, etc. to the 2% estimation from the EPA inventory). The GHG emissions produced by U.S. beef cattle contribute only a fraction of the GHG emissions attributed to global beef production, as most cattle in the world are located outside U.S. borders. ***U.S. beef cattle emissions are less than ½ percent of the world's GHG emissions***.[6]

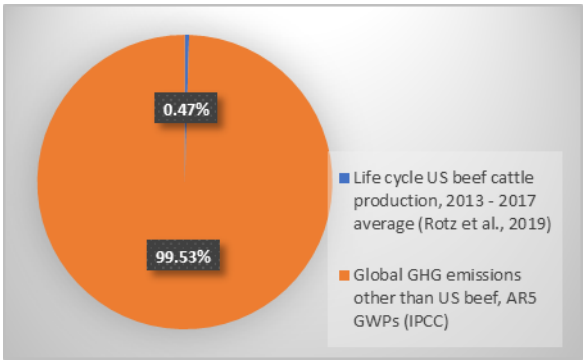

Figure 1. *U.S. beef cattle production emissions in the context of total global GHG emissions*

Upcycling is the Ruminant Advantage

Cattle are ruminants. This means they have a symbiotic relationship with the microorganisms that live within their specialized stomach compartments that provides them their upcycling superpower. Upcycling is converting something of little to no value to a higher value product. Cattle upcycle every day, converting solar energy in plants that's inaccessible to humans to high-quality protein, micronutrients, and ancillary products such as leather and pharmaceuticals. The U.S. beef cattle industry provides more than two times the high-quality protein (accounting for amino acid profile and bioavailability)[7] to the U.S. food supply than cattle consume: cattle directly contribute to food security. Additionally, beef is rich in micronutrients such as Zinc, Iron, Selenium, Choline, Niacin, Riboflavin, Vitamin B_{12} and Vitamin B_6.

Cattle Provide Far More than Beef

Cattle production results in more benefits to society than just the excellent nutrient package that is beef. Cattle are a source of fiber (leather), fertilizer, fuel, and wealth. Beef cattle operations represent over 1/3 of U.S. farms and ranches[8] – the single largest segment of U.S. agriculture. Cattle production preserves and enhances grassland ecosystems. Cattle grazing can help mitigate the risk of catastrophic wildfires.[9] Cattle grazing lands help regulate and purify the water supplies for major municipalities in the United States.[10] Conservatively, the ecosystem services of cattle ranching and farming provide $24.5 billion of societal value in the U.S.[11] In short, cattle production is a key part of the social fabric of America, from cultural contributions of cowboy Americana to provisioning of heart valves to people. Cattle are a self-replicating, solar-powered plant-based protein source with numerous unmatched co-benefits. Humanity has depended upon cattle production for the whole of civilization and will continue to do so far into the future: beef cattle production is sustainable.

Beef cattle production is always getting better

Despite having a highly resilient and efficient beef production system in the USA currently, cattle producers are always looking for ways to get better. Compared to 1975, it takes 36% fewer cattle[12] to produce the same amount of beef today. This dramatic improvement in efficiency has been driven by improvements in beef cattle genetics, nutrition, biotechnologies, and husbandry practices that result in improved animal well-being. Research and extension and adoption of new knowledge is a continuous process that delivers on incremental improvements in reducing beef cattle production's resource use and environmental impacts. Advancements in grazing land management, genomically-enhanced expected progeny differences (EPDs), methane-inhibitors, integrated crop-livestock systems, water recycling technology, and manure composting are just a few of the examples of new technologies being deployed and tested that will further enhance the sustainability of U.S. beef production. Ultimately, the U.S. beef industry is resilient and well-positioned to continue to provide U.S. and international consumers a superior animal source food in a socially and environmentally responsible manner for decades to come.

For more information, go to www.beefresearch.org/beefsustainability.aspx

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