

# Understanding GREENHOUSE GASES

## What are greenhouse gases?

Greenhouse gases (GHG) are gases in the earth's atmosphere that trap heat. They let sunlight pass through the atmosphere, but they prevent the heat that the sunlight brings from leaving the atmosphere.



## Are greenhouse gases bad?

We couldn't live on earth without greenhouse gases. It would be too cold. But now there are too many (attributed mostly to human activity) and the earth is heating up. Most states and countries have set goals for reducing GHG emissions to prevent the earth from getting too warm.

## What are the main greenhouse gases and what are their differences?



### Carbon dioxide (CO<sub>2</sub>)

Carbon dioxide (CO<sub>2</sub>) comes from the burning of fossil fuels. It accounts for ~80% of greenhouse gases and is the primary cause of global warming, as there's more of it and it stays in the atmosphere for ~100 years. The goal is to reduce and eventually eliminate the burning of fossil fuels; not as easy task.



### Methane (CH<sub>4</sub>)

Methane (CH<sub>4</sub>) accounts for ~12% of greenhouse gases but has 80x the warming power of CO<sub>2</sub>. However, it is much shorter-lived, only about 10 years in the atmosphere. Ruminants are a source of CH<sub>4</sub>, since methane is a by-product of rumen fermentation (cellulose digestion). Worldwide, livestock account for ~11% of GHGs; ~4% in the US. The contribution of livestock to GHG emissions is grossly over-exaggerated by the media and anti-animal agriculture activists. At the same time, all sheep, goat, and cattle producers should strive to reduce GHG emissions on their farms and ranches.



### Nitrous oxide (N<sub>2</sub>O)

Nitrous oxide (N<sub>2</sub>O) accounts for ~6% of greenhouse gases. It is the most powerful greenhouse gas; 270 times more potent than CO<sub>2</sub>, while remaining in the atmosphere for more than a century. Agricultural soil management is the largest source of N<sub>2</sub>O emissions.

## There are many ways ruminants can and will help to meet the goals of GHG reduction:

1. Improve production efficiencies; fewer animals emit less methane.
2. Genetics (genomics and EBVs): select sheep, goats, and cattle that naturally emit less methane.
3. Use diet, feed additives, rumen modifiers, and vaccines to reduce CH<sub>4</sub> production in the rumen.
4. Manure management. Cover manure lagoons and capture CH<sub>4</sub> and convert it to energy.
5. Graze the "fuel" that causes wildfires, which are big emitters of greenhouse gases.
6. Well-managed pastures serve as carbon sinks and reduce CO<sub>2</sub> emissions.