ECO2 A Revolutionary Approach to Sustainable Dairy Production

As the world races to reduce carbon emissions, the livestock industry has come under increasing scrutiny for its contribution to global greenhouse gas emissions. Although greenhouse gas emissions from livestock account for less than 10% of total US emissions, livestock represent the largest agricultural source of methane emissions which is a potent greenhouse gas that traps 28 times more heat in the atmosphere than carbon dioxide. Livestock such as cattle produce methane naturally as they digest feed through a process called enteric fermentation. Enteric fermentation enables cattle to eat forage and other low-quality feedstuffs that humans are not able to digest and transform it into the nutritious meat and milk products we consume. This unique ability plays a major role in global food security meaning that we can not simply eliminate cattle, but instead there are opportunities to improve the efficiency and reduce enteric methane emission of cattle while continuing to provide high-quality, nutritious meat and milk products for consumers. One such opportunity is to utilize genetic selection for ECO_2 by STgenetics® which will improve Feed Efficiency, productivity, and longevity of cattle resulting in reduced methane emissions and subsequently the environmental impact of each unit of meat or milk that the livestock industry produces.

What is the ECO_2 index by STgenetics®?

ECO_2 is the industry's first genomic index to quantify the lifetime methane savings of dairy females and terminal beef cattle based on reducing enteric methane emissions. By leveraging over a decade of research for Feed Conversion Efficiency from STgenetics®' exclusive EcoFeed® program, ECO_2 combines genetics for Feed Efficiency with production and longevity traits to create high producing cattle who have lower enteric methane emissions and improved resource utilization.

What traits are included in the ECO_2 index?

ECO_2 combines traits that have the greatest impact on the lifetime methane emissions of cattle:

1. Feed intake - Feed intake is the largest driving factor of methane emissions in cattle as cattle produce methane during digestion. As cattle consume more feed, they produce more methane, so STgenetics® utilizes breeding values for dry matter intake developed from their EcoFeed® program to estimate daily feed intake of heifers and cows.

2. Productive life - Cattle consume feed daily to provide energy for maintenance and performance. Productive life is a genomic value used to predict the time that a female is expected to remain in the herd which can be used in combination with daily feed estimates to compute total estimated feed consumption for the lifetime of an animal.

3. Productivity - Cattle produce milk or meat to provide healthy food products for consumers around the world. The emissions intensity of milk is therefore determined based on calculating the total emissions per unit of product which can be done by incorporating genomic values for milk, fat, and protein to compute lifetime energy corrected milk.

How is ECO_2 index calculated?

ECO_2 quantifies an animal's lifetime methane emissions based on the carbon emissions model recommended by the Intergovernmental Panel for Climate Change (2019). This model estimates daily enteric methane emissions for livestock based on a methane conversion factor that translates dietary gross energy consumption into units of methane produced. Utilizing over 4 million daily feed intake records captured as part of STgenetics® EcoFeed® program, ECO_2 incorporates genomic dry matter intake values to adjust average gross energy consumption values for each stage of production to estimate daily methane emissions. Utilizing national genomic evaluation breeding values for production and productive life metrics in dairy females and performance data in terminal beef on dairy cattle, daily methane emissions are then translated to lifetime methane emissions. Lifetime methane emissions are then converted to carbon dioxide equivalents (CO_2e), the standardized unit of measurement for greenhouse gases. Index values are reported as the tons of CO_2e saved during the lifetime of the animal compared to the industry average.

Electronic feedbunks are used to measure daily dry matter intake of individual animals.

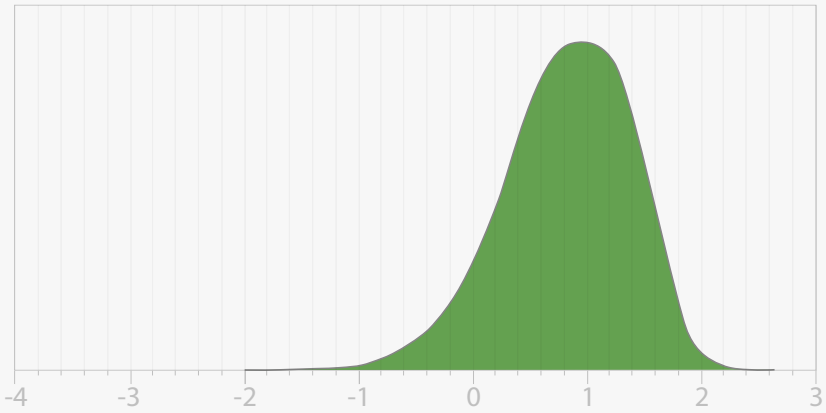
Breathe analyzers are used to measure methane, oxygen, and carbon dioxide emissions of individual-animals.

How does ECO_2 index translate to carbon savings?

ECO_2 is expressed as tons of CO_2e savings during the lifetime of a dairy female compared to the industry average. An ECO_2 index of 1 indicates that an animal's progeny will produce 1 ton less CO_2e during their lifetime compared to the average dairy female.

Distribution of ECO_2 index

Mean = 0.77
SD = 0.54
Top 1% = 1.88
Top 10% = 1.44
Top 30% = 1.11
Minimum = -3.75
Max = 2.5



Since 2017, livestock producers have utilized STgenetics®' EcoFeed® index combined with other economically relevant traits to improve the economic and environmental sustainability of their herd. Given the increasing requirements for carbon accounting today, STgenetics® believes the ECO_2 index will take this program to the next level, accelerating genetic improvement for carbon friendly cattle in a way that can be measured, monitored, reported, and verified.

STgenetics® is proud to provide the dairy and beef industries with innovative tools such as ECO_2 to aid in creating a sustainable industry and world for the next generation of farmers and consumers.