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Prediction of Effects of Beef Selection Indexes on Greenhouse Gas Emissions

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Abstract

Genetic improvement in production efficiency traits can also drive reduction in greenhouse gas emissions. This study used international 'best-practice' methodology to quantify the improvements in system-wide CO2 equivalent emissions per unit of genetic progress in the Irish Maternal Replacement (MR) and Terminal (T) beef cattle indexes. Effects of each index trait on system gross emissions (GE) and system emissions intensity (EI) were modelled by estimating effects of trait changes on per-animal feed consumption and associated methane production, per-animal meat production and numbers of animals in the system. Trait responses to index selection were predicted from linear regression of individual bull estimated breeding values for each index trait on their MR or T index value, and the resulting regression coefficients were used to calculate trait-wise responses in GE and EI from index selection. Summed over all trait responses, the MR index was predicted to reduce system GE by 0.810 kg CO2e/breeding cow per year per € index and system EI by 0.009 kg CO2e/kg meat per breeding cow per year per € index. These reductions were mainly driven by improvements in cow survival, reduced mature cow maintenance feed requirements, shorter calving interval and reduced offspring mortality. The T index was predicted to reduce system EI by 0.021 kg CO2e/kg meat per breeding cow per year per € index, driven by increased meat production from improvements in carcass weight, conformation and fat. Implications for incorporating an EI reduction index to the current production indexes and long-term projections for national breeding programs are discussed.

https://doi.org/10.1017/S1751731117002373

The study reported here in this Research Brief was not funded by the beef checkoff, but is made available to expand the usefulness of this checkoff-funded website for those interested in beef sustainability. Internal links within this document are funded and maintained by the Beef Checkoff. All other outgoing links are to websites maintained by third parties.