SELECTION FOR RESIDUAL FEED INTAKE CAN CHANGE METHANE PRODUCTION BY FEEDLOT STEERS

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SUMMARY
A 70-day residual feed intake (RFI) test on a barley-based feedlot ration was conducted, over which daily feed intake (FI) and weekly liveweight of 91 Angus steers were recorded. Rate of enteric methane production (MPR) was measured in a series of 5 x 2-day consecutive measurement periods using a marker-based method with the marker gas (SF_6) released from an intraruminal permeation device. Data for 76 steers with 3 or more valid 2-day methane collections were analysed. The 43 low-RFI (high efficiency) line steers (progeny of 9 sires) and the 24 high-RFI (low efficiency) line steers (5 sires) represented approximately 2.4 generations of divergent selection for postweaning RFI. An additional nine intermediate unselected line steers were included. MPR (g/day) was highly-significantly related to daily FI (kg/day) over the 10-day gas-collection period: MPR=13.0 ±3.0 (se) x FI +34.9, although FI (P<0.0001) explained only 20% of the variance in MPR. From this relationship MPR over the 10-week RFI test was predicted. MPR predicted for the low-RFI line steers was not significantly lower than for the high-RFI line steers (187 ±4 *v* 199 ±4g/day; P>0.05). Regression analyses showed MPR to be significantly related to genetic variation in RFI (P<0.05), such that a 1 kg/day reduction in estimated breeding value for RFI would be accompanied by a 13.0 ±5.1g/day, or 7%, reduction in methane production. This result supports predictions that reduction in methane emissions should accompany the reduction in FI following from selection for lower RFI.
Keywords: beef cattle, methane, feed efficiency, residual feed intake, greenhouse gas

INTRODUCTION
The agricultural sector is a major source of greenhouse gas emissions worldwide and methane from livestock is a significant component of this. There are currently few practical strategies to reduce enteric methane emissions from livestock without reducing stock numbers (Herd *et al.* 2002). Since methane production is highly dependent on the quantity of feed consumed (Blaxter and Clapperton 1965), reducing feed intake is one way of reducing emissions. Residual (or net) feed intake (RFI) is a measure of feed efficiency in beef cattle and is calculated as the amount of feed consumed net of that predicted based on weight and gain. Cattle with low RFI eat less than expected for their weight and growth rate, and are therefore more efficient than cattle with high RFI. That it is possible to breed cattle that consume less feed than anticipated for their weight and growth rate offers the potential to reduce methane production by selection for lower RFI (Herd *et al.* 2002). This study sought to quantify the association of RFI with methane production by cattle consuming a feedlot diet.