



**Event** Montreal (CA), ICAR 2022  
Annual Conference

**Subject** Abstract presented manuscript  
as ORAL presentation

**Title of the presentation**

Measuring individual carbon dioxide emissions as a proxy for feed efficiency on dairy farms preliminary results

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**Session:**

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**ABSTRACT**

The challenges of measuring individual feed efficiency on dairy farms has hampered its use both in farm management and genetic selection. Improving feed efficiency is crucial from an economic perspective, because feed cost represents more than 50% of the total operating cost of milk production. On the other hand, feed efficiency is also important from an environmental point of view, since more efficient cows require less agricultural land for feed at the same level of milk production. The concept of residual carbon dioxide (RCO<sub>2</sub>) is similar to the index of residual feed intake (RFI), and used as a proxy, could potentially enable ranking cows based on feed efficiency. In this study, we aimed to assess the relationship between RCO<sub>2</sub> and RFI in mid-lactation (100 to 200 days in milk), using data of 226 cows from six experiments with individual feed intake records. Carbon dioxide production was measured by GreenFeed units. Residual CO<sub>2</sub> (kg/day) and RFI (kg of dry matter/day) were estimated using a mixed model approach. Three cow groups (high/mid/low) of equal sizes were formed both for RCO<sub>2</sub> and RFI. Cows in the high RCO<sub>2</sub> group produced 2.51 kg/day (95% CI: 2.28 – 2.74, p<0.001) more carbon dioxide than their low RCO<sub>2</sub> herd mates. At the same time, high RCO<sub>2</sub> cows had 1.17 kg/day (95% CI: 0.89 – 1.46) higher RFI compared to their low RCO<sub>2</sub> counterparts. The overall classification accuracy based on RCO<sub>2</sub>, using RFI as a reference, was 47.9%, however, inefficient (i.e. high RFI) cows could be identified with 59.1% accuracy. In conclusion, relevant differences were found between RCO<sub>2</sub> groups in terms of feed efficiency. Therefore, routinely collecting individual carbon dioxide emissions seems to be a promising tool to record feed efficiency on a large scale. :



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