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## 1. Title

**Milk fatty acids can predict enteric methane emissions from dairy cows fed various diets<sup>(1)</sup>**

## 2. Authors

Adeline Bougouin<sup>1</sup>, Jayasooriya Ranga Niroshan Appuhamy<sup>2</sup>, Anne Ferlay<sup>3</sup>, Ermias Kebreab<sup>4</sup>, Cécile Martin<sup>5</sup>, Peter Moate<sup>6</sup>, Chaouki Benchaar<sup>7</sup>, Peter Lund<sup>8</sup> and Maguy Eugène<sup>9</sup>

1 Animal science, PhD, Postdoctoral at INRA Clermont-Ferrand, France

2 Animal science, PhD, Assistant Professor, Iowa State University, USA

3 Animal science, PhD, Senior Scientist at INRA Clermont-Ferrand, France

4 Animal Science, PhD, Professor at University of California, Davis, USA

5 Animal science, PhD, Senior Scientist at INRA Clermont-Ferrand, France

6 Veterinary Science, PhD. Senior Scientist at Agriculture Victoria Research, Ellinbank, Australia

7 Animal Science, Ph.D. Senior Scientist, Agriculture and Agri-Food Canada, Quebec, Canada

8 Animal Science, PhD, Professor at Aarhus University, Denmark

9 Animal science, PhD, Senior Scientist at INRA Clermont-Ferrand, France

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## 3. Abstract

Proxies are needed to develop genetic selection of low methane (CH<sub>4</sub>) emitting ruminants and to evaluate at large scale, CH<sub>4</sub> mitigating strategies on farm. Milk fatty acids (**MFA**) have been used as proxies to predict CH<sub>4</sub> emissions from dairy cows because of common rumen biochemical pathways between the two processes. The objectives of the study were (1) to construct a set of empirical models to predict CH<sub>4</sub> emissions using MFA records of individual lactating dairy cows (n =825) fed a wide range of diets, (2) to increase the representativeness of the models by including additional independent variables such as dietary chemical composition [organic matter (**OM**); neutral detergent fiber (**NDF**); crude protein (**CP**); starch; ether extract (**EE**)], milk yield and composition, and animal characteristics [days in milk (**DIM**)

or body weight (**BW**)], and (3) to evaluate the performance of the developed models on two independent datasets (individual measurements and treatment means). Prediction equations based only on MFA [*C10:0*, *iso C17:0* + *trans-9 C16:1*, *cis-11 C18:1*, and *trans-11,cis-15 C18:2* for CH<sub>4</sub> production (g/d); *iso C16:0*, *cis-11 C18:1*, *trans-10 C18:1*, and *cis-9,cis-12 C18:2* for CH<sub>4</sub> yield (g/kg of dry matter intake (**DMI**)); *iso C16:0*, *cis-15 C18:1*, and *trans-10+trans-11 C18:1* for CH<sub>4</sub> intensity (g/kg of milk)] have root mean square error of 58.6 g/d, 2.8 g/kg DMI and 3.7 g/kg milk, respectively. The models including DMI, dietary nutrient contents (NDF, EE, starch), and BW had lower root mean square errors of 42.8 g/d, 2.5 g/kg DMI and 3.3 g/kg milk, respectively.

#### 4. Index terms: cattle, methane equation, milk fatty acids

Session 1: technical advances: from genomics to precision agriculture, that will address aspects to measuring and modelling GHG