

Editorial: Greenhouse gases in animal agriculture: science supporting practices

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The populational growth, the increase of demand for livestock product, the technological progress, the changes in income distribution, concerns related to climate change and environment have been driving the scientific community to develop knowledge regarding sustainable animal agriculture. Climate change represents a significant threat, with an estimated increase of the average global temperature at the end of the 21st century (compared with 1980 to 1999) between 1.8°C (B1 scenario) and 4.0°C (A1FI scenario) (IPCC, 2007). This shift in temperature represents a direct and indirect impact on agriculture systems as well as on human and animal health. Animal agriculture sustainable production systems can present key solutions in a changing climate, at the same time as reducing its impact so as not to aggravate it further (Gaughan *et al.*, 2019).

In this context, the Greenhouse Gas and Animal Agriculture Conference (GGAA) is the premier international conference summarizing the collective state of scientific knowledge on greenhouse gas abatement strategies and production systems adaptation needs for the livestock sector. This gathering features leading scientists and policymakers reviewing the current state of knowledge and presenting significant new developments in policy, measurement, modelling, mitigation and adaptation efforts associated with greenhouse gases from animal agriculture.

The Conference took place every 2 years in the first three editions and every 3 years since 2010 when the main abstracts were published as full article in special issues of peer-reviewed journals (McAllister *et al.*, 2011; Dewhurst, 2013; Eckard, 2016). Finally, GGAA2019 happened for the first time in Latin America, which focused on the theme 'Science supporting Practices'.

At the GGAA2019 conference, held in Iguassu Falls, Brazil, almost 200 delegates from 39 countries gathered to participate in a program featuring 11 invited keynote speakers, 47 offered presentations and 111 poster presentations. Of the 158 papers presented at the Iguassu Falls, 7 were selected and survived critical review and are in this Special Issue. The 7th meeting in the series was organized in Brazil in August 2019, jointly by Brazilian Agricultural Research Corporation—Embrapa, University of São Paulo—USP, São Paulo State University—UNESP, Instituto de Investigaciones Agropecuarias—INIA/Chile and Instituto Nacional de Tecnología Agropecuaria—INTA/Argentina.

Despite the fact that the countries located in the tropical belt of the Earth are important players for worldwide food production, there were gaps related to carbon balance and specific models for enteric methane predictions in tropical livestock production systems as pointed in GGAA 2013 by Berndt and Tomkins (2013). This Special Issue addresses these gaps in the Oliveira *et al.* (2020) paper that showed the effects of intensification of tropical pastures on carbon balance and by Ribeiro *et al.* (2020) that compiled a database of CH₄ emissions to evaluate prediction precision and accuracy of extant equations and to develop novel equations for predicting enteric methane emissions from cattle in tropical conditions. Furthermore, Ku-Vera *et al.* (2020) reviewed the strategies for enteric methane mitigation in cattle fed low-quality tropical forages.

During the GGAA meetings, it was possible to observe the increase in options for dietary strategies with the potential to mitigate enteric methane, with emphasis on the use of vegetable oils (Ludemann *et al.*, 2016), secondary compounds (Samal *et al.*, 2016), nitrate (Guyader *et al.*, 2016) and 3-nitrooxypropanol evidenced by the 10 papers published in GGAA2019 (Berndt *et al.* 2019). In this special edition, Williams *et al.* (2020) showed the positive effects of the association of fat or tannin to reduce methane yield in dairy cattle.

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There has been growing interest in the potential to breed ruminants for reduced CH₄ emissions and Lassen and Difford (2020) discussed the genetic and genomic selection as a methane mitigation strategy in dairy cattle. Regarding the advances in techniques to measure enteric CH₄, Hristov and Melgar (2020) demonstrated that the relationship of enteric methane emission measured using Green Feed and Dry Matter Intake in dairy cows depends on the time of measurement relative to the time of feeding. Therefore, a sufficient number of gas samples, covering the entire 24-h feeding cycle, have to be collected to have representative emission estimates using the green feed system.


Finally, the review 'Climate Finance and the Livestock Sector' by Masse and Gerber (2020) showed the challenges and opportunities to encourage sustainable livestock practices.


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Declaration of interest

Not applicable.

Ethics statement

Not applicable.

Software and data repository resources

Not applicable.

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