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Greenhouse gas mitigation in animal production: towards an integrated life cycle sustainability assessment

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The animal food chain contributes significantly to emission of greenhouse gases (GHGs). We explored studies that addressed options to mitigate GHG emissions in the animal production chain and concluded that most studies focused on production systems in developed countries and on a single GHG. They did not account for the complex interrelated effects on other GHGs or their relation with

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other aspects of sustainability, such as eutrophication, animal welfare, land use or food security. Current decisions on GHG mitigation in animal production, therefore, are hindered by the complexity and uncertainty of the combined effect of GHG mitigation options on climate change and their relation with other aspects of sustainability. There is an urgent need to integrate simulation models at animal, crop and farm level with a consequential life cycle sustainability assessment to gain insight into the multidimensional and sometimes conflicting consequences of GHG mitigation options.

Highlights

► Most studies that address options to mitigate greenhouse gas (GHG) emissions in the animal production focus on systems in developed countries and on a single GHG. ► Current decisions on GHG mitigation in animal production are hindered by the complexity and uncertainty of the combined effect of GHG mitigation options on climate change and their relation with other aspects of sustainability. ► There is an urgent need to integrate simulation models at animal, crop and farm level with a consequential life cycle sustainability assessment to gain insight into the multidimensional and sometimes conflicting consequences of GHG mitigation options.

Article Outline

- Introduction
- Mitigation options
 - Improving efficiency in crop production
 - Improving efficiency in animal production
 - Reducing enteric CH₄ emissions
 - Improving manure management
 - Sequestering soil carbon (C)
 - Changing consumption of animal-source food (ASF)
- Integrated life cycle sustainability assessment
- Conclusion
- References and recommended reading
- Acknowledgements
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