Session 4.1: Climate Change Mitigation Strategies.

S04.O-05

ESTIMATION OF ENTERIC METHANE EMISSION IN ITALIAN DAIRY HERDS: APPLICATION OF IPCC EQUATIONS USING DHI DATA.

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Livestock milk and dairy chains contribute about 72% to the total agricultural Green House Gas (GHG) emissions, mainly CH_4 generated by enteric fermentation and NO2 from manure management.
The dairy sector accounts for approximately 30% of the GHG emissions of the livestock sector and 4% of the total anthropogenic GHG emissions.
Approximately 80% of the CH_4 emission of the dairy sector originates from enteric methane (CH4).
Intergovernmental Panel on Climate Change (IPCC) set up a model for livestock CH4 emission estimation based on NRC equations for Gross Energy (GE) intakes.
Italian Institute for Environmental Protection and Research (ISPRA) applies the IPCC method at the national level based on a Tier 2 approach. However, the accuracy of the CH_4 estimation is undermined by gross averages estimation for key parameters like milk yields and quality, herd composition, reproductive parameters, etc.
Here we attempt to refine the ISPRA figures by exploiting DHI longitudinal data at animal and herd levels. Within a 365-day temporal sliding window, we calculate the exact daily herd composition per animal physiological status and gender (lactating and dry cows, heifers, young bulls, and bulls). Milk yields and composition (fat and proteins) and reproductive parameters were collected monthly per cow trough official DHI recording.
Such accurate data were used as input of the IPCC equation tier 2 for the Gross Energy estimation (MJ $head^{-1}year^{-1}$) by animal categories, the key information to estimate the Emission Factor for Enteric fermentation (CH_4 $head^{-1}year^{-1}$). In a 1500 Holstein dairy farm sample, the enteric average emission ranged from 0.0198 ± 0.0018 to 0.066 ± 0.096 Kg CH_4 Kg^{-1} of whole fresh milk.
Interestingly, we observe a negative correlation between herd size and total CH_4 per unit of products.
The results - expressed in kg CH_4 $head^{-1}$ $year^{-1}$ or kg CH_4 kg $milk^{-1}$ $year^{-1}$ - have been composed into a synthetic report at the herd level, instantly available through AIA's proprietary Si@lleva software.
The idea is to provide farmers with an easy-to-use basic tool to monitor etheric methane emission, improve feed efficiency, and foster the deployment of the mitigation action plan.