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ASPA 24th Congress Book of Abstract

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ASPA 24th Congress

Padova, September 21–24, 2021

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feeds, crops activities, energy consumption, transports and water utilization for crop production and animal management. Methane from enteric fermentation and manure management, nitrous oxide from manure and soil management, CO_2 from energy consumption and soil organic carbon sequestration (C-sink) were considered and expressed as kg CO_2eq. The bWF embedded the water used for crops irrigation, sprinklers, cleaning parlour equipment and drinking of animals and was expressed as litres. The effect of SCOs on CF and blue WF intensity was evaluated considering the summer-winter (SW) production rate that measures the efficiency of SCOs on milk yield. Specifically, the CF and bWF were modelled using the value of SW referring to no cooling conditions which was then compared to the CF and bWF of the farms under study.

The CF intensity was 1.247 kg CO_2eq./kg FPCM and it ranged from 1.014 to 1.619 kg CO_2eq./kg FPCM. When the C-sink was included, the range of CF lowered from 0.972 to 1.576 kg CO_2eq./kg FPCM with an average impact of C-sink of about –1.3%. The higher sources of emissions were enteric fermentation and feed production (about 81%). The CF modelled for the no cooling scenario resulted in higher (0.8%) than the cooled one. The energy for SCOs contributes only to the 0.4% of the total CF. The bWF intensity was 161 litres/kg FPCM and it ranged from 35 to 276 litres/kg FPCM. The irrigation (both on-farm and extra-farm feed) was the main contributor (98%), whereas the water for SCOs accounted for 0.2% of total bWF. In general, SCOs of the selected farms reduced the bWF by 1.3% compared to the modelled scenario of no cooling operations.

Summer cooling management of dairy cattle is an important adaptation strategy to warming climate scenarios and, although fans and sprinklers increase energy and water consumption, the improvement of animal welfare has a positive effect on milk production and therefore on carbon and water footprint intensity.

O066

Farm-level mitigation strategies to improve sustainability of milk production: effects on GHG emissions

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Greenhouse gas (GHG) emissions per unit of milk have declined over the past 50 years, due to improvements in production efficiency and animal performances. However, the decline in emission intensity may be insufficient to offset the rising absolute emissions from increasing global demand for animal products. In this context, it's important to know which dairy systems combine high productivity and low environmental impact. Recent studies pointed out that farm sustainable intensification strategies, e.g. improvement of feed efficiency and crop production, are related to more sustainable milk production. The aim of the study was to evaluate the effect on GHG emissions, related to milk production, of mitigation strategies (MS) based on the optimization of forage production, conservation and use in the cow diet. Between 2016 and 2020, in 20 dairy cattle farms, representative of the most widespread forage systems (FS) of northern Italy, different MS were applied. Life Cycle Assessment, accounting for changes in GHG associated with changes in farm management, was performed to evaluate the environmental impact of milk production, both in terms of emission intensity (CF, carbon footprint, expressed as kg CO_2eq/kg FPCM, fat and protein corrected milk) and absolute emissions (kg CO2eq/hectare).

The results pointed out that High-Quality FS is the most favourable system in terms of GHG emission intensity (1.17 kg CO_2eq/kg FPCM), while, considering absolute emissions, less intensive systems, such as Mixed Forages and Parmesan Dry Forage FSs, seem to be more sustainable (21,104 and 16,699 kg CO_2eq/ha, respectively). The Mixed FS showed an improvement of CF within the two years (from 1.38 to 1.17 kg CO_2eq/kg FPCM), even though absolute emissions didn't change. The reduction of GHG emission intensity in Mixed FS may be probably related to the increased area cultivated with forage legumes, together with the partial replacement of soybean in the ration. Multiple correspondence analysis revealed that the reduction of CF seems to be associated with the inclusion in the diet of forages with high nutritive value, the increasing of forage conservation efficiency and the replacement of soybean meal with forage legumes in the diet.

In conclusion, MS-based on optimization of forage production, conservation and use in the diet seem to contribute to improving the environmental sustainability of milk production.

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O067

A tool to efficiently replace dairy heifers using genomic information

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Genomic testing is an efficient tool for breeders, providing useful information for their management and selection decisions. An approach that is increasing worldwide is genotyping the entire